The Veterinary Record

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 39. SEPTEMBER 24, 1938 VOL. 50.

The Double Intra-dermal Tuberculin Test

DELAYED POSITIVE REACTIONS

D. A. E. CABOT,

CHIEF VETERINARY OFFICER,
MINISTRY OF AGRICULTURE AND FISHERIES

It was recently brought to the notice of the Animal Health Division of the Ministry that positive reactions to the double intra-dermal tuberculin test had been observed on the fourth or fifth day after the application of the sensitising dose of tuberculin, in animals that showed neither positive nor doubtful reactions at the usual final reading time, 72 hours after the beginning of the test.

A peculiar feature of these reports received from practitioners is that the delayed reactions had been observed only in herds submitted to the tuberculin test for the first time and, to some extent, this was supported by the experience obtained in certain herds where, on re-test within 60 to 90 days, a high proportion of the animals reacted at or before the 72nd hour after the beginning of the test, whereas at the first test, only a few reactors had been found. It was thought, in the light of later experience obtained elsewhere, that unobserved delayed reactions at the first test might have accounted for the unexpectedly high proportion of reactors revealed at the second test.

These reports on the frequent occurrence of late reactions in animals tested for the first time were received from practitioners in Scotland. So far as could be ascertained, similar observations in England and Wales were rare.

The growth of the Attested Herds Scheme, its (then) contemplated extension to rearing herds, the projected Tuberculin Test Survey of self-contained herds and the increasing advantage of tuberculin testing that is being taken by farmers called for a field trial to be made on a reasonably large scale.

The purposes of the trial, which was divided into two parts, were

(*a*) to determine whether animals tuberculin-tested for the first time, non-reactors at the 72nd hour, react to the test at a later time, and, if so, what is the proportion of such late reactors, and

(*b*) whether delayed positive reactions occur in animals that have previously been subjected to the tuberculin test.

It was considered desirable to extend the trial under (*a*) to all parts of Great Britain and herds have been tuberculin tested in 70 of the 78 Divisions into which the country is divided. The observations under (*b*) were confined to herds being officially tested under the Attested Herds Scheme, and in which reactors were observed at the 72nd hour. Practically all these herds were being subjected to the pre-attestation test and had therefore been tested on two or more occasions. All tests and observations were made by whole-time veterinary officers of the Ministry. The tuberculin used was the synthetic-medium preparation obtained from the Royal Veterinary College, Camden Town.

(*a*) HERDS TESTED FOR THE FIRST TIME

Under these arrangements, 318 herds were tested by the double intra-dermal method, applied in the orthodox manner and read at the customary times but, in addition, a further observation was made at the 120th hour.

The results were as follow:—

In 33 herds, 655 animals tested, no positive reactors. In 285 herds, 16,719 animals tested, 5,791 animals reacted. Readings at 72 hours:

Negative	11,563
Positive	4,856
Doubtful	300

Readings at 120 hours:—

Additional Positive ...	935

of which, at the 72nd hour,
804 were negative
131 were doubtful.

At the last reading, there were 202 animals classified as "doubtful," some of which had been so described at the previous observation but a proportion had been read as "negative" at the 72nd hour.

The 935 delayed positive reactors represent 16 per cent. of the total number of reactors

determined in the course of this trial. Among these late reactors, the excess of animals recorded as "negative" at the 72nd hour over those recorded at that reading as "doubtful" will be noted.

The percentage of delayed reactors to the total number of reactors in each class of animal is as follows:—

Bulls	8·25%
Cows	21·42%
Calves	5·83%
Other cattle	9·69%

The incidence of late reactors varies in different herds but these tests show that the problem of delayed positive reaction is not a local one as cases have been observed in the course of this trial in all parts of the country.

Several of these delayed reactors have been bought by the Ministry and will be subjected to further test and examination.

(*b*) Observations in Herds Previously Tested

The official tests offer to whole-time veterinary inspectors limited opportunity to make observations comparable to those made under (*a*), as official tests are almost confined to herds presented for attestation and which necessarily have passed two tests without any reactor being disclosed. Where, however, reactors have been found in the course of official tuberculin testing, a further visit has been made on the sixth day—corresponding to the 120th hour observation under (*a*) — but only one delayed reactor has been found at this time in 41 herds in which this late observation has been made.

Whilst it is clear that when conducting tests of cattle of unknown history or known to be tested for the first time, the possibility of late reaction must be taken into consideration, it is equally clear from the results of the observations recently made by veterinary officers of the Ministry that the methods of procedure in force for the Attested Herds Scheme are in no way invalidated by these observations. No question, therefore, arises of any alteration in the manner in which the double intra-dermal test is applied and read under the Attested Herds Scheme and accordingly the procedure at present in force will be continued, the final reading being made at the 72nd hour.

The projected Tuberculin Test Survey of self-contained herds, on the other hand, is intended to reveal those herds from which tuberculosis is absent or in which its incidence is sufficiently low to offer prospects of its eradication, with a view to the rapid expansion of the number of attested herds. The Survey will be confined to herds that have not been previously tested and consequently, as a result of the trial recently made, it will be necessary to introduce a change in the time when the final reading of the tests is made. In these herds, the reading at the 72nd hour will be omitted and will be replaced by a visit at the 96th hour. Under these arrangements, animals reacting before the 48th hour will come under notice at the time of administration of the diagnostic dose of tuberculin; those reacting during the third day will still be recognisable at the 96th hour. A number of observations which have been made suggest that the reactions noted at the 120th hour, but not present at the 72nd, are evident at the 96th.

The object of this note is to call attention to the occurrence of a considerable proportion of delayed positive reactions to the tuberculin test in a field trial carried out in many parts of Great Britain. It would seem, on the evidence available at the moment, that such delayed reactions are likely to be encountered in considerable numbers only in animals that have not previously been subjected to the test. The reason or reasons for the occurrence of these abnormal reactions, in the circumstances described, is a matter for further investigation.

SOIL EROSION IN TANGANYIKA

"An interesting memorandum on soil erosion, by Mr. E. Harrison, director of agriculture, Tanganyika, has been issued by the Government of the Territory," states *Nature* in a recent issue. "A representative committee appointed to advise on the problem formed the opinion that the primary method of attack should be educative rather than ameliorative, and with this end in view the already existing authorities, such as forestry, veterinary and agricultural offices, were instructed to demonstrate the serious nature of the loss caused by soil erosion, and to arouse interest in the methods by which it could be checked. In some districts the systems of land management evolved by the native cultivators were practically ideal counters to water erosion, but in others considerably time and patience will be required before the value of, and necessity for, adopting entirely new practices is realised. The relations between over-stocking and soil erosion are particularly intricate. The native husbandman is only capable of maintaining large numbers of cattle on land more or less denuded of persistent vegetation, as otherwise he incurs the ravages of ticks, flies and worms, and these are just the conditions which accelerate soil erosion. In view of this, the director of the veterinary services has outlined a scheme by means of which overstocking may be relieved. The chief items are: expansion of a rotational grazing system, increased water supplies and the control of the type and number of stock carried, and control of grass burning. Application of scientific knowledge coupled with some form of legislation is regarded as the best way of furthering the interests of the native. Anti-erosion rules have already been drawn up in a number of districts, with considerable success."

"OBSERVATIONS ON A CONTAGIOUS BOVINE ABORTION VACCINE EXPERIMENT"

DISCUSSION ON MR. W. R. KERR'S PAPER

[We reproduce below the report of the discussion on the paper on the above subject presented by Mr. W. R. Kerr, M.R.C.V.S., D.V.S.M., of the Veterinary Research Division, Ministry of Agriculture for Northern Ireland, presented at a joint meeting of the North of Ireland and V.M.A. of Ireland Divisions, N.V.M.A., held at Belfast on June 4th, 1938. Mr. Kerr's paper received publication in our issue of June 11th (*V.R.* 50. 24. 717-730).]

Mr. J. F. Timoney (Veterinary Laboratory, Thorndale, Dublin), opened the discussion in the following terms:

My first duty is to express my appreciation to the V.M.A.I., for the honour accorded me in inviting me to open the discussion on Mr. Kerr's paper on this happy occasion, when members of our profession from all parts of Ireland are convened together in the common interests of veterinary science. My next duty is to congratulate the Northern Ministry of Agriculture on possessing the necessary foresight to equip and staff a centre of research into animal diseases, and supplying it with adequate funds for the active prosecution of research and diagnosis. In spite of the industrialisation of Northern Ireland agriculture still remains the basic industry, and within recent years has shown considerable expansion.

When I first entered on my career as a novice to laboratory work, it was my privilege to be appointed to the laboratory at Stormont, where there was an internal staff consisting of three veterinary surgeons, two technical assistants, and a laboratory attendant. At that time, in the year 1930, the principal work of the institute was confined to diseases of poultry, and as a beginner, especially a practitioner, I felt somewhat disappointed at the subjects on which I had to work. However, I was soon disillusioned as to what I then thought was the relative unimportance of the poultry industry, on being informed that the export value of poultry and poultry products in Northern Ireland exceeded the output of one of the largest shipbuilding yards in the world for which this city is famous. Not many years have passed since then, and now, we find the laboratory has outgrown recognition. The staff has been generously increased and diseases of the large farm animals are being investigated on a fairly extensive scale with the aid of substantial financial grants. We have also noted with great pleasure that the Pig Marketing Board of Northern Ireland, realising the value and necessity for research into diseases of swine, have increased their annual grant to £1,500.

Before proceeding to discuss the recorded researches of Mr. Kerr, to whom I offer my felicitations on the work he has accomplished, I wish to hold your attention for some little time on a few preliminary remarks concerning some aspects of the disease under discussion.

Not since the experiments of Bang and Stribolt, M'Fadyean and Stockman, Jensen, Smith and Little, and those of the German Imperial Board of Health, has any determined effort been made by any country to tackle the problem of vaccination against contagious abortion, if one excepts the continuous work of Cotton and his associates in the U.S.A.

The intensive study of biological methods, designed to attack that symptom of the disease which is of paramount importance to agriculture, and which has rendered it a disease of national importance, namely, the inability of the infected cow to carry her calf to full term, has been neglected. That this is so is quite apparent to anyone attempting to keep in touch with the enormous output of work on the Brucella genus and its infections. As the range of activities of the Brucella genus has widened, researches have tended to become more divergent and less concentrated on the kernel of the problem, being pursued along certain channels far removed from the practical problem.

Certain cogent reasons may be advanced for this neglect or lack of progress. First, the lack of appreciation of the importance of the disease to the livestock industry by the responsible authorities in different countries. Secondly, the heavy expenditure incurred in experimenting with adult bovines. Thirdly, the lack of adequate accommodation in the form of pasturage at different research centres. Fourthly, the length of time abortion experiments on the bovine take to mature. Even where all facilities are available the average experiment on a bovine animal, and of necessity always with a limited number, may take from twelve to eighteen months or longer to mature. It therefore follows that in the study of immunity and vaccination progress is bound to be slow. From the viewpoint of the research worker the immunity problem in this disease is not a profitable study, results being slow in maturing and generally of a negative practical value.

The present requirements of the stockowner are (*a*) a reliable preventive, and (*b*) a reliable curative agent.

The second requirement may be dismissed at once since no agent has been discovered that has any just claim as a curative agent. With regard to the first requirement there is no reliable preventive available. All present day vaccines, either living or dead, have not yielded, when thoroughly and fully tested in the field, reliable results. The stigma of inconsistency is attached to all abortion vaccines.

Good results in the hands of one practitioner or research worker are followed by poor or indifferent results in the hands of others. Success on one farm succeeded by failure on another farm with the same vaccine is the experience of most people.

Up to the present most vaccines prepared against this disease have consisted of inoculations of the living or killed organism, and one is tempted to think that most work in this direction has had a tendency to remain in the one groove. The time is now overdue when we should change our methods of preparation and explore all possible avenues by which an efficient vaccine may be produced. Let us take living vaccines. Experiments with these have been confined to strains attenuated by age, strains of low guinea-pig virulence, and to virulent strains containing a considerable proportion of rough variants administered by inoculation into the non-pregnant animal in the hope that when the animal becomes pregnant natural infection will be overcome by the immunised tissues of the exposed animal, thus affording a barrier of protection to the foetal membranes and foetus. With regard to dead or killed vaccines prepared by the usual methods, *i.e.*, grown on ordinary laboratory media and killed by heat or chemicals, even when used in repeated doses on the pregnant animal these have yielded very poor results, and as immunising agents, are much inferior to the live vaccine.

The immunity conferred by live vaccines is only relative, and is easily broken down if the vaccinated animals are exposed to intensive natural infection. It may be proper at this stage to recall to your memory, that any serviceable degree of immunity conferred by live vaccines should extend for at least twelve months as a minimum, and to be really satisfactory under practical conditions should continue for 15 months considering the difficulty in securing many heifers to hold service to the first, second, or third mating. It is indeed probable that the immunity following live vaccines is greatest when it is least required owing to the stage of placental development, *i.e.*, during the four months following inoculation, and is on the wane during the critical period, namely, from the third month of pregnancy onwards when the animal requires the maximum degree of immunity. It should be possible of experimental attainment to construct a graph indicating the height of immunity following the inoculation of live bacilli as ordinarily practised in the field.

The following account of a herd known to the author where vaccination failed to protect 33·3 per cent. of the newly purchased cows when exposed to intensive natural infection is suggestive of the influence of the vaccine in prolonging the gestation period in the aborting animal. In this large mobile herd with a very high annual abortion rate, and where vaccination with the live vaccine has been practised for several years, examination of the available breeding records over a period of eight consecutive months in 1937 covering 40 abortions in cows (many of which might be termed premature calvings), shows 57 per cent. of the animals to have expelled the foetus within approximately the last two months of pregnancy. The high percentage of late abortions may be subjected to different interpretations owing to infection prevailing on the farm, but since 33 of the animals were purchased as young cows the very late period of pregnancy at which the foetus was expelled appears significant. As is usual in herds of this class no unvaccinated controls were kept, and one is left in doubt as to the value of the vaccine in prolonging the gestation period. Nevertheless the remarkably high percentage of late abortions is suggestive of some immunising effect induced by vaccination. If this interpretation is the correct one it might be accepted as indicating a declining immunity during the pregnant state.

The immunity conferred on heifers is of a very low degree, but is considerably higher in cows. This difference between cows and heifers is susceptible of explanation in herds where infection is prevailing but not in others, and may be a associated with the presence of a functioning udder or the pre-existence of a basic immunity in the older animal. Pregnant animals which have been inoculated subcutaneously for several consecutive years during pregnancy with a massive dose of attenuated live bacilli without aborting or developing extensive disease of the placenta, may break down completely and abort on the intravenous inoculation of a large dose of the same culture strain. We have had such an experience in our herd at Thorndale (unpublished experiments). It is, however, not to be contended that under natural conditions an animal would ever receive a degree of natural infection corresponding to the experimental test dose mentioned, and the experiment has been quoted simply to indicate that although the immunity conferred was of a high degree it was not absolute. Following vaccination there is no such immunity conferred as occurs in several of the other bacterial diseases, *e.g.*, black-quarter, braxy, anthrax and swine erysipelas where a high grade immunity is established. If we consider the cause of our inability to confer adequate protection by vaccination attention will naturally be first drawn to the organism, and here we note that not by any of our present-day methods of cultivation have we succeeded in detecting by experimental methods the presence of a soluble toxin. It is true that the metabolic products in a broth or liquid culture medium on inoculation into infected animals may produce a thermal or skin response. These

reactions are regarded as allergic reactions and no evidence has been produced that they result from the action of a true toxin. Nevertheless, we have evidence in the widespread pathological changes produced in the gravid uterus of the toxic effect of the organism, and at present we attribute these changes to the existence of an endotoxin present in the bodies of the bacilli. Experiments have also indicated that the endotoxin is not a powerful one.

On reviewing those bacterial diseases where neither a soluble toxin has been demonstrated nor an effective antiserum has been prepared against the specific causal organisms, we find that vaccination has not yielded satisfactory results. Repeated injections of killed organisms possessing potent endotoxins give some measure of protection in these infections, but the best results have been obtained with the living organism where this is practicable; and even with this type of vaccine the immunity appears to last a relatively short period being in some diseases largely determined by the persistence of the organism in the tissues of the host. So, in studying the physiology of the abortion bacillus we have one clue indicating why the preparation of an efficient vaccine has proved so difficult. We may, therefore, reason with sufficient justification that any immunity conferred by the live vaccine in Bang's disease is not antitoxic but antibacterial, the immunity being chiefly confined to the tissues, thus classing the disease as one of those in which the immunity is regarded as of the nature of a tissue immunity.

Let us reflect for a moment on what we are trying to achieve when we propose immunising an animal against Bang's disease. We are attempting to immunise the non-pregnant animal, so that when pregnancy ensues, the placenta shall be protected from invasion by the *Br. abortus*. The difficulty in securing adequate protection following vaccination appears to be due to several factors: first, the absence of any demonstrable blood immunity; secondly, the tissues of the non-pregnant animal are those in which no active disease is produced even by the inoculation of large doses of virulent organisms, thus resulting in a very low immunity response; and thirdly, the placental tissues are not present for some considerable time after vaccination and do not share in any immunity established in the retroplacental tissues. It may be stated here in amplification of the third reason adduced, that according to Hammond, the developing placenta in the bovine species does not become completely attached to the uterus until pregnancy has advanced into the second month, and, assuming the animal to have been vaccinated two months previous to conception a strong immunity would be necessitated to tide the placenta over the remaining months of its development until pregnancy is terminated. The placenta, for its protection in the vaccinated ruminant has to rely solely on the active immunity acquired by the retroplacental tissues, since owing to its anatomical and physiological features it does not permit of the passage of any protective bodies from the maternal to the foetal circulation. This characteristic of the ruminant placenta does not appear of much importance, if we are correct in assuming that there is no blood immunity established following vaccination. So the placenta remains *in situ*, unable to derive passive immunity from any blood immunity which may be present—although all the evidence points to there being none, and without any active immunity of its own.

My remarks on the subject of immunity would not be complete without reference to the relationship of agglutinins to immunity and infection. All the available evidence tends to prove that agglutinin concentration in the blood provides no indication of the level or degree of immunity in Bang's disease. The presence of agglutinins, except in suckling calves, indicates past or present infection but their absence does not indicate the absence of infection. When studied over a period of time the agglutination titre serves a useful purpose in indicating the degree of infection present. Within limits, it may be interpreted to express infection in quantitative terms. This statement is made with due regard to lag periods in infected pregnant heifers and occasional cows, where the infection may be very widespread and yet the agglutinin response is of a very low order.

It also appears that there is a level in agglutinin production beyond which the tissues of the host fail to respond, and this point may be as readily reached with a small dose as with a dose several times larger of the same suspension of bacilli. One point of importance in relation to agglutinins that has not been solved is, if the decline in agglutination titre exactly coincides with the elimination of infection, or if not, at which point in a declining titre may infection be taken to have been eliminated. It is generally accepted, that the elimination process has gone on to completion before agglutinins have finally disappeared from the blood stream. There is, so far, no experimental proof that this explanation is correct and exceptional cases have been reported where the organism has been isolated in the absence of a positive agglutination titre. In these cases titration with very low serum dilutions may have shown the presence of agglutinins.

In studying the disease as it occurs naturally, we observe that a previous abortion confers a degree of immunity which is of great value

under practical conditions, that a second abortion is uncommon, and a third abortion rare. Successive abortions, where *Br. abortus* is the causative agent, generally occur towards the end of pregnancy. The majority of animals that abort remain infected for years, and carry their subsequent calves to full time despite exposure to continuous natural infection. We are here presented with the interesting and paradoxical condition of the host with one or several foci of infection within its body resisting natural infection, and despite its acquired immunity is unable to eliminate the resident organisms from its tissues. There are defensive forces at work which prevent those organisms within the body from causing any or extensive disease of the placenta during successive pregnancies. That it is to the defensive forces of the host that this immunity is due, and not to an attenuation of the resident organisms for the bovine placenta, is proved by the fact that this class of animal may be a potent source of infection to susceptible animals. The immunity of such an animal may be so high that detailed examination of the placenta at subsequent pregnancies may even reveal no evidence of disease, despite the fact that the animal is a high reactor and shedding organisms in its milk. In other aborted and "carrier" animals the resistance is not so complete, and although the foetus is carried full term there may be slight or moderate disease of the placenta. In fact, the level of immunity of the animal is reflected by the extent to which the placenta is diseased. It would be useful and interesting to learn if the immunity infection balance in "carrier" cows could be broken down during pregnancy by the intervention of intercurrent disease or other depressing influences similar to what occurs in "carrier" animals of certain protozoal infections. How much of the resistance conferred by a previous abortion in a "carrier" animal is due to the persisting foci of infection is open to discussion. The opinion is shared by some workers that immunity in this disease is an infection immunity, the animal being in what is now termed a state of premunition, the immunity waning as the infection dies out. On the contrary, however, there is ample field evidence that a fair percentage of animals recover from infection subsequent to aborting and still carry their calves to full term although exposed to natural infection side by side with their high reacting companions. In this connection, the term "recovered animal" is employed to cover those cases where the organism has not been recovered from the placenta, vaginal discharges, or milk, and where the agglutination reaction has dropped to negative or very low dimensions.

Much work requires to be done on the immunity of the recovered cow compared with that of the high reacting cow and on the susceptibility of the recovered cow compared with that of the non-infected cow.

There is no doubt a vast difference in the immunity which follows a clinical abortion and that created in the non-pregnant animal by inoculation of living bacilli. This difference is apparently explained by the fact that, in one animal the organism attacks a highly susceptible tissue causing widespread lesions, whilst in the other, the tissues are relatively resistant. On comparing the level of immunity which follows actual abortion with that obtained by the administration of massive doses of live organisms by the parenteral route, one might conclude in face of all the available evidence, that in the much greater resistance conferred by abortion the most potent factor or factors in inducing the immune state is not associated with immense bacillary infection, but with those products formed in the placenta as a result of the action of the bacillus on the embryonic placental tissue cells. It should, therefore, be our object to try by diligent research to imitate nature's method of immunisation, and it is to be hoped that the time may yet come when we shall be capable of inducing a similar immunity without any of the undesirable sequels which accompany nature's method.

At the moment, we cannot immunise the placenta either actively or passively, and have to depend entirely on the immunity conferred by inoculation of living bacilli some months prior to conception to protect the new and rapidly growing placenta.

In attempting to control this disease by vaccination success would probably attend our efforts, if by means of a suitable vaccine we could create an immune zone surrounding the foetal membranes and foetus; this zone being represented by the retroplacental tissues,* the degree of immunity of which should be adequate to kill off infection gaining entrance from natural sources before the invading bacilli have had time to reach the placental structures. In other words, we might try to imitate in the animal, that method so frequently and successfully adopted in the field for controlling isolated outbreaks of rinderpest in hitherto clean areas, where a deep immune zone is created surrounding the centre of infection, thereby preventing the spread of infection excentrically, the object, however, in Bang's disease being to prevent infection spreading concentrically, *i.e.*, towards the foetal membranes and foetus.

As yet no live vaccine possessing all its antigenic components has been prepared which can be inoculated with safety into the pregnant bovine. If future work should show that it is

* The term retroplacental is used for brevity and is intended to denote all those tissues other than the foetal membranes and foetus.

possible by experimental methods to alter the affinity of Bang's bacillus for bovine placental tissue, then we might be furnished with a vaccine, the introduction of which into the pregnant animal would act as a satisfactory immunising agent for all the tissues, including the placenta.

With regard to Mr. Kerr's and Dr. Common's accomplished work I have very few comments to offer by way of criticism. We have listened to an account of a fine piece of work extending over a long period of time necessitating numerous detailed bacteriological, serological, biological and biochemical tests. It is true that very few people realise the amount of time and energy that experimental work requires and this is particularly true of Bang's disease. It is often possible to write within the compass of a few pages what has taken months to accomplish, and it frequently strikes the research worker that the onlooker does not appreciate the value of research unless it results in something of immediate practical value. Assessment of the value of research by this criterion is of course totally fallacious because many of the most important discoveries originated from the investigation of problems which had no practical significance at the time.

Although the results obtained by Mr. Kerr have been largely of a negative practical value from the point of view of the preparation of a reliable vaccine, I hope that you do not intend leaving this meeting with the opinion that the preparation of such a product is a hopeless pursuit. The necessity for such a product is obvious to everyone who has given this disease serious study in either this country or Great Britain. Therefore experiments designed to advance our knowledge of abortion vaccines and the assessment of their value by experimental methods are always justified and require no defence. It is a proven fact that the disease can be eradicated from a herd by adopting systematic blood testing and hygienic precautions but unfortunately this method of eradication is only applicable in certain herds constituting a small minority of our total herd population and even in this minority the method is only successful with certain owners. It is also well established that the disease is much more prevalent in large commercial herds, many of which have been created for filling milk contracts, and which are not self-contained. Another factor which militates against the general application of segregation methods is that the incidence of the disease is very high in dairying districts.

The researches of Mr. Kerr might at first sight appear to many of you to be of more interest to the laboratory worker than to the clinician but this is more apparent than real because if the end results are of a negative practical value the observations recorded during the experiment are of the greatest importance to the practitioner attempting to eradicate the disease by serological methods, such as the agglutination test. The proper interpretation of this test in the eradication of the disease has been brought home as a result of these controlled experiments in a very forceful manner.

It is not my intention to criticise or comment on the principles of vaccine production enunciated by Mr. Spahlinger and which with certain modifications have been adhered to by Mr. Kerr. It may be sufficient to state that several vaccines have been successfully prepared against diseases through the cultivation of the specific causal organisms on artificial media and by passage through animals which when tested experimentally and in the field have proved reliable. Likewise for the production of toxins artificial media are being freely used to-day and toxins produced on such media have been found to possess full antigenic strength in eliciting the formation of antitoxins capable of neutralising toxins elaborated in the living body. Again we have the undoubted evidence of the efficient immunising products produced by treatment of toxins with chemical agents, *e.g.*, formalin in which the toxin is rendered innocuous without its antigenic properties being destroyed.

The question of natural death of the organism is rather intriguing and requires further elaboration. Does it imply the death of the organism from old age? If we take a non-sporulating bacillus such as *Br. abortus* or the tubercle bacillus growing in artificial culture, we know that multiplication of the organisms by fission occurs as long as environmental conditions are favourable but once the nutritive or gaseous requirements of the organisms become altered and/or when the metabolic products have reached a certain threshold the bacilli begin to die gradually unless implanted on fresh media. This death of the organism which occurs in the test tube culture is not analogous to the death of the organism in the animal body.

It is true that owing to the peculiarities of some organisms they require special media for their cultivation, and for toxin producing organisms certain media are known to be much superior to others for the elaboration of toxin. There is no doubt that as the science of biochemistry advances media production will become an exact science and less empirical than it is to-day, resulting in media of known chemical compositions which may be altered to suit the special requirements of certain organisms. Bacterial biochemistry is as yet in the infant stage, and we are still very much in the dark concerning those factors which are concerned with the growth and energy requirements of bacteria. We know practically nothing

of the bacterial metabolic processes which occur in the parasitised cell of the host. However, it is only natural, since bacteriology is a comparatively young science, that most attention has been concentrated on the study of morphological, tinctorial and cultural characters, but the time is now ripe when efforts should be made to study the biophysical and biochemical processes occurring in the parasitised cells of the host. Up to the present we have been largely concerned with the end results of bacterial action, *i.e.*, the pathological picture produced, the intimate processes occurring in the period intervening between infection and the formation of definite pathological changes remaining a closed chapter. In *Br. abortus* we have an outstanding example of the extreme affinity of the bacillus for a certain kind of tissue and here no doubt it is the specific biophysical and biochemical processes associated with the growth and development of the embryonic placental tissue which favour the growth and multiplication of the organism with resultant widespread disease of the parasitised cells. Indeed an intensive study of the physiology of the bovine embryonic placental cell should furnish much useful information to the research worker engaged on a study of Bang's disease. A detailed study of the biochemical products formed in the parasitised placental cell might possibly furnish us with the solution to the problem of immunity in this disease.

We are all indebted to Mr. Kerr and his colleagues for departing from the stereotyped form of abortion vaccine by preparing a dead vaccine according to a modification of Mr. Spahlinger's principles and assessing its value by experimental methods.

The criticisms I have to offer are few in number. It is stated that in the preparation of the medium, filtered mixed uterine fluid incorporated with and superimposed on a sloped trypsin agar base was employed and one would like to learn if any attempts had been made to grow it on uterine fluid alone. The criticism also suggests itself that the culture medium selected might be improved on. As we know, *Br. abortus* has a special affinity for the chorion which is its ideal habitat and it would appear that because of its presence in the allantoic and amniotic fluids it should not be accepted that in the pregnant infected animal they act as a culture medium although they may contain the organism. They are apparently contaminated by extensions from the chorionic lesions and in some instances from the infected foetus. However, the use of uterine fluid has many advantages in that it is present in large quantity in close approximation to the predilection site and can be readily filtered. There is no evidence submitted concerning the virulence of the strain used in the preparation of the vaccine for the guinea-pig as compared with that of the strains infecting the four cows from which the vaginal discharges were obtained for testing the immunity of the vaccinated and control heifers. This may be regarded by many as a rather moot point but there is sometimes noted a difference in the pathogenicity of freshly isolated strains of the *Br. abortus* for the guinea-pig interpreted according to the extent and variety of lesions produced in that animal. Sufficient work, however, has not been done to show how far this difference in virulence in the guinea-pig is applicable to the pregnant cow. The vaccine was prepared from a single strain whereas the infection test doses consisted of a mixture of four different strains and there is the remote possibility that the virulence of the test strains may have been greater than that of the single vaccine strain. In the preparation of the vaccine 0·2 per cent. formalin was added presumably to kill off any remaining live organisms and to act as a bactericidal agent during the use of the vaccine but there is the possible disadvantage that this chemical treatment may have had a deleterious effect on any toxic or metabolic products produced by the bacillus during cultivation in the special medium, and here, one might suggest the alternative method of prolonged storage in vacuum or in an inert gas at a very low temperature in the dark until the vaccine suspension was proved by cultural and biological tests to be dead. This would obviate to a high degree oxidation changes and the possible undesirable effect of chemical treatment.

With regard to the early experiments on the use of the vaccine on guinea-pigs, positive splenic cultures were at first accepted as a criterion but were eventually discarded as being unreliable. It might have been better to have stated that splenic cultivation which is highly reliable was too sensitive an index as to infection and would not prove of much service in differentiating quantitatively between the different degrees of infection present. A very interesting feature in the guinea-pig experiments is the frequency with which well-marked lesions in the form of abscesses in the liver and testicles were noted and in several cases associated with emaciation. In our experience at the Thorndale Laboratory, Dublin, gross lesions—apart from an enlarged spleen which may or may not be roughened and sometimes showing small grey nodules or dull grey points occasionally associated with minute grey points or small greyish-white nodules in the liver—are unusual. Very occasionally a moderate enlargement of the lymph nodes is observed. Testicular and epididymal lesions are very seldom observed. The general finding is an enlarged spleen which is not invariably present in *Br. abortus* infection without any apparent nodule formation. The

presence of other lesions is extremely variable even in guinea-pigs receiving the same inoculum and allowed to survive for the same length of time. The pathogenicity of the Stormont strains for the guinea-pig in the experiments quoted resemble in many respects those employed by American workers and it might prove interesting to ascertain how they would react to typing experiments.

Regarding the value of the vaccine as tested by the guinea-pig experiments, a certain degree of resistance was conferred but was not sufficient to overcome the effects of the test dose, and reasoning on the partial protection conferred on the guinea-pig as judged by the appearance of gross lesions on *post-mortem* examination, experiments were conducted on heifers. It is universally accepted that the guinea-pig is a very useful animal for the diagnosis of Bang's disease but in our experience it is not so useful an animal on which to carry out immunity experiments unless the objective aimed at is that of a sterile immunity, *i.e.*, where the immunity is not associated with the presence of organisms in the tissues. If one does not achieve this condition in the guinea-pig its value as an experimental animal in Bang's disease is greatly lessened. The pathogenesis of *Br. abortus* infection in the guinea-pig and pregnant bovine differ greatly with resultant different pathological pictures. In the guinea-pig the spleen is the predilection site whereas in the pregnant bovine it is the embryonic placental tissue. In the former animal the organism according to its virulence may affect the spleen, liver, testicles, lymph nodes and other organs producing multiple lesions which may even progress to abscessation, whereas in the pregnant bovine for all practical purposes the only lesions found are those situated within the uterus. As previously commented on, we are faced with two difficulties in the preparation of an efficient vaccine against Bang's disease, one being the very low virulence of the organism for all bovine tissues outside those contained within the pregnant uterus with the result that the immunity response to inoculation of either living or dead organisms is, relatively speaking, of a low degree. The second difficulty is the extreme affinity which *Br. abortus* possesses for the bovine placental tissues making our method of approach very difficult owing to the specific anatomical and physiological peculiarities of the organ.

The bovine experiment was well planned but there are a few points which the reading of the paper has not made clear. With regard to the vaccinated and control animals one would like to know if they were confined to the same paddock or paddocks and allowed to mix freely after the infection exposure test period had passed. The reason for asking this question is that if the animals were allowed to mix until the termination of the experiment reinfection may have occurred through different animals aborting at different times. The rise in the agglutination titre of animal B5 might be, as has been suggested, due to an unobserved abortion or to the alternative explanation that the animal may have become re-infected from the discharges of an aborting comrade. It is always a wise precaution never to accept pregnancy as being established on the basis of the absence of oestral signs and in special work requiring the use of pregnant animals rectal examination of the uterus should always be resorted to. The experiment was designed to ascertain if the vaccine would protect virgin heifers when subsequently mated and exposed to infection during the pregnant state. The vaccination process consisted of eight separate inoculations of 20 ml. vaccine into each animal extending over several months, the majority of which were administered during the pre-pregnancy period. It would be interesting to learn what result would have been obtained if the inoculations had been made during the first four months of pregnancy subsequently followed by exposure to natural infection. Considering the number and dosage of the inoculations one is inclined to the opinion that any protective effect developed in the animal body by the early inoculations had largely, if not altogether, disappeared by the length of time which elapsed before pregnancy ensued.

Three questions of great importance to the veterinary practitioner and stockowner have been asked by Mr. Kerr. What is to be regarded as a positive agglutination titre? Within recent years in our experimental work at Thorndale we accept a complete reaction in a serum dilution of 1 in 8 as indicating exposure to infection at some time or other. There is a period in the history of every animal infected with this organism in which the blood serum agglutinates in a dilution of 1 in 8 and even lower. It simply depends on the time when the blood sample is taken. It is advisable, however, if a routine method of testing serum in dilutions of 1 in 8 is adhered to, also to perform tests with dilutions of 1 in 16 and 1 in 32 owing to the possible occurrence of the so-called prozone phenomenon which in some strongly positive sera obscures the reaction in the first or second tube. A reaction in the dilution of 1 in 8 is more likely to be determined during the declining phase than during the ascending phase of the blood serum titre because, generally speaking, the titre rises more rapidly from the region of low dilutions than it declines below such dilutions. There is a definite tendency for a falling titre to lag when the low dilution region is reached. A reaction in a low dilution may occur in either a falling or rising titre, the former indicating the

partial or possibly complete elimination of infection, and the latter the development of infection. This low reaction may also occur in certain animals which are in contact with high reactors and here it is noted that the titre may remain stationary for months even with an intervening pregnancy, suggestive of the influence of very small subinfective doses of the bacillus picked up at pasture or from other sources. There must be a large number of animals which contract very slight infection through minute doses of the organism but where the infection is rapidly overcome resulting in the development of a very low titre which gradually wanes after some time. The disadvantage, particularly in the field, of accepting a very low titre as a standard of infection is that one may include a large proportion of animals that are harmless but on the other hand if such reactions are disregarded the titre may represent a developing infection and the animal a potential aborter. It is much safer to test all sera in dilutions of 1 in 8 or 1 in 10 and regard all reactors as dangerous until repeated tests indicate in which direction the titre is travelling. By following this procedure owners will not be in a position to condemn the test by pointing to an animal or animals which may even have passed two consecutive tests at an interval and then aborted a few weeks afterwards. Finally, with regard to the question of non-specific or so-called normal agglutinins to which some workers attach importance in this infection without any exact experimental support, as a result of our work at the Thorndale Laboratory on cattle, guinea-pigs and rabbits, we have never yet detected the presence of non-specific agglutinins in a serum dilution as low as 1 in 8 and it is exceedingly questionable if such agglutinins for *Br. abortus* exist in these animals.

The second important question asked by Mr. Kerr is: Does a low titre indicate a potential aborting animal in a recent outbreak of contagious abortion? A reaction in a low titre may indicate a potential aborting animal under such circumstances. Under similar conditions in a flying or mobile herd it may represent a declining, rapidly rising or persistent infection or, what has been exemplified to a high degree in the Stormont researches, it may represent one of those lag periods in agglutinin production. If such a reaction is observed in a pregnant heifer in an abortion infected herd it should be viewed with alarm.

Concerning the third important question—Does a very high titre indicate an aborted animal more often than a potential aborting animal?—the answer is in the affirmative. Heifers very frequently record a very low agglutination titre prior to abortion and for a short period afterwards and their behaviour in this respect is different from that of infected pregnant cows which subsequently abort. Perhaps the difference can be explained by the presence of a functioning udder on the cow, thereby providing a site where the organism can multiply, or by the fact that the cow, being an older animal, has had more opportunities of contracting infection and of developing a more substantial blood titre.

In the discussion on the agglutination titres recorded by the vaccinated and control animals considerable weight is attached to the prompt rise in titre following natural infection. The issue here is somewhat clouded by the fact that the vaccine inoculations had established a high titre in all animals by the time they were exposed to intensive natural infection as judged by the graphs. Furthermore, every vaccinated animal received a further inoculation of vaccine subsequent to the natural infection exposure test. It is therefore impossible to separate vaccine reaction from natural infection reaction and unwise to conclude that the high titre resulted from the natural infection alone in the absence of a few control vaccine animals the blood tests of which would act as a basis for comparison.

One very interesting observation recorded in the paper—an observation which is not new but has been again brought to our notice and which causes one to reflect—is the very low agglutination titre that may exist in the pregnant heifer although the placenta may be extensively diseased. In this it is not a question of incubation period but is a problem intimately associated with the localisation of the vast majority of the organisms to the pregnant uterus and the question naturally arises, if organisms are so numerous in the uterus why is not a greater agglutinin response produced? One explanation may be that owing to the situation and structure of the placenta and it being the predilection site, few organisms are carried from it to the maternal tissues until the act of abortion occurs. The question of bacteraemia obtrudes itself here. Blood cultures performed on a number of low reacting pregnant heifers at short intervals extending over the pre-parturition, parturition and post-parturition periods might reveal information which would solve some of the points in this interesting problem.

With regard to the period of incubation for an agglutinin response to occur under natural conditions where infection has been contracted by ingestion it is obviously impossible to fix a period as so many variables may be operating in any one instance. It is probable that where infection is followed by a long period before an agglutinin response is obtained, multiplication and dissemination of the organism by the blood and lymph channels has to occur before an agglutinin response is obtained. This explanation is suggested by the longer delay which

occurs after the application of the organism by the oral or conjunctival routes as compared with results obtained by the subcutaneous or intravenous methods.

Finally, before concluding my remarks, I wish to refer to the abnormally high agglutination titre shown by the calf control of animal B8. One should like to learn if the calf was bled immediately after birth or before being suckled by the dam. The reason for asking this question is because blood reactions in newly born calves that have not received colostrum are extremely rare and when they occur the reactions are low, but once suckled, agglutinins may be demonstrated in the calf's blood within a few hours and within the next few days rise to considerable proportions. This phenomenon simply represents the passive transference of the concentrated globulin protein fraction of the colostrum to which the agglutinins are attached through the intestinal mucous membrane of the calf which is very permeable to the colostrum proteins at this age, in order to make good the deficiency of globulin protein in the newly born calf's blood. If it is assumed that the blood titre resulted from active infection in the calf then we are confronted with an instance where the newly born calf has produced a better agglutinogenic response than its dam.

I wish to compliment Dr. Common and Mr. Kerr on Part II of the paper. Their work on the plasma and globulin fractions of the blood serum represents work from a new angle—which I do not propose to discuss, principally because any remarks I could add would be entirely drawn from the literature and no work of this kind has yet been undertaken at Thorndale. Finally I wish to thank you all for the patient hearing you have given me and if the opening of the discussion has appeared unduly long I beg to be excused on the score that Bang's disease has been my chief study for a number of years past at the Laboratory of the Department of Agriculture, Thorndale, Dublin.

Professor W. Kearney (Dublin) continued the discussion and, complimenting the author, said that the experiment was a valuable contribution to the data on this subject. The experiment was well carried out and by showing that vaccination was of little value it confirmed work done in other countries. He was of the opinion that some other method of dealing with abortion would have to be adopted and complete eradication by slaughter and compensation by the Government seemed to him the only way. Blood testing and segregation of reactors as at present practised were of little value since it was difficult to ensure adequate segregation in the midst of widespread infection and because so few farmers are in a position to attempt it.

Mr. P. Harnett (Dublin), who also complimented the author on his paper, said that at the Dairy Congress, in Berlin, the general impression was that vaccination was of little value in the control of abortion and that eradication either by segregation or slaughter of affected animals seemed to be the only solution. He agreed that the agglutination test was not too satisfactory and that eradication of the disease, using the agglutination test to detect reactors, had broken down in many places. He mentioned that certain states in America and Esthonia had adopted the slaughter policy with excellent results; also, that Sweden was at present adopting that method. Mr. Harnett referred to the transmissibility of the disease to man and to the fact that the disease in humans was being notified in America. In Germany milk from animals affected with abortion had to be pasteurised. He thought that the veterinary profession ought to decide very soon what steps should be adopted to eradicate this disease which was of such economic importance to the farmer.

Professor J. J. O'Connor (Dublin) complimented both the author and the opener of the discussion upon their valuable contribution on a very important subject. He said he was not qualified to discuss the paper but he followed it with great interest—the subject was so lucidly dealt with. He had read an interesting and exhaustive paper on Brucellosis by a French veterinarian, Dubois, and from it he got the impression that the allergic reaction was more reliable than the agglutination test for the purpose of diagnosis, that sheep were very successfully vaccinated against abortion by a live vaccine, and that melitensis infection in the human subject could be prevented by a polyvalent vaccine. He wondered what were Mr. Kerr's views on these points.

Mr. J. D. Whitty (Dublin) said that Mr. Kerr and his colleagues deserved great praise for the very valuable work they had carried out. Such work was naturally costly but was eminently worth while. The experiments, though on a small scale, were productive of very useful results. Mr. Kerr's paper, and Mr. Timoney's excellent opening, were full of interest. With Mr. Timoney he agreed that this vaccine seemed to be one which should be considered a dead vaccine, which had been killed by the added formalin, and not one which had been allowed to die naturally. The medium used was not uterine fluid alone, and it would be interesting to learn if an attempt had been made to grow the Brucella on extracts of foetal membranes. The difficulty in using vaccines for the control of bovine contagious abortion was largely one of attempting to immunise non-existing tissue. It seemed that if some drug could be discovered with an action on *Brucella abortus*, like that of prontosil on haemolytic streptococci, control of the disease would be in sight. A useful result of Mr. Kerr's paper would be that many practitioners, some of them very prominent in their profession, who had believed, without any scientific basis for the claims they advanced for this vaccine, that in it there had been found a 100 per cent. certain preventive against bovine contagious abortion, would now see that, unfortunately, the vaccine was no specific against the disease. To meet colleagues in the North in the day's discussions was a real pleasure, and it was to be hoped that such joint meetings would become more frequent.

Mr. J. W. Morrow (Coleraine) congratulated Mr. Kerr on his very honest paper, which showed how really little they knew about the course of abortion. Vaccination, in his hands, was very unsatisfactory, but he got good results by rearing heifer calves on abortion infected cows. If a cow aborted he washed her out with saline solution every day for a week or more

and did not serve her for three or four heats afterwards. He mentioned a friend in Scotland who was feeding yeast to the cows and that yeast was supposed to be of value because of its nuclein content.

Mr. P. A. Rogan (Dublin) expressed the belief that vaccination, as referred to at the meeting, would not prove satisfactory and that Professor Kearney's suggestion concerning eradication would be good if economic considerations did not prevent it. He thought that the two associations, acting independently in the first instance, should go into the economics of the complete eradication method and after learning the extent of the disease, etc., have another meeting to consider the problem in detail.

Professor T. G. Browne (Dublin) said that most of the points he had in mind had been very ably dealt with already by Mr. Timoney in opening the discussion. He quite agreed that, as matters stand at present, eradication would appear to be the only course open as a means of getting rid of this disease, although he quite realised the difficulties to be surmounted in this connection. However, he would not like workers on abortion vaccines to be in any way discouraged as to the usefulness of their work because, apart from the vaccine, many important side issues might arise from such work, the benefit of which might not perhaps be apparent at present, but might be realised later on in the light of further knowledge as research progressed. He thought Mr. Kerr's experiment had brought out a number of interesting points. One was the delayed agglutination reaction, after infection, in the dilutions now generally accepted as positive. This would suggest that a policy of eradication based on the agglutination test would have to adopt a much lower standard as a reaction—even as low as 1 in 8 or 1 in 10. The globulin analyses were also very interesting. The results of Mr. Kerr's experiment, although mainly negative, raised a number of important side issues which would be worth following up.

Mr. L. Magee (Co. Meath) had nothing to say regarding the subject under discussion, since he felt he was quite out of his depth, but said he would like to stress the great pleasure he had in meeting his colleagues in the North and thank them for their hospitality. It was good to meet old friends and if he had not got a cure for abortion he had learned other things from the general conversations among his friends. He would encourage wholeheartedly the continuance of these yearly joint meetings.

Professor A. F. O'Dea (Dublin) remarked that there were at present two means of eradicating bovine abortion, one by means of vaccination and the other by means of segregation, neither of which was very satisfactory. Vaccination did not limit the spread of the disease especially if live vaccine were used. Eradication was not an easy procedure and the cost to the country and the dairyman was enormous. To be effective eradication would need to be Government controlled. He thought that chemotherapeutic methods ought to be investigated. Wheat-germ oil had been used in France and England with a measure of success. Prontosil, which had been reported to have been used successfully in some cases of undulant fever, might also be of some value and was worth attention. The paper had shown that the agglutination test for diagnostic purposes was not by any means satisfactory and that up till now the standard titre had been much too high. As President of the Veterinary Medical Association of Ireland, Professor O'Dea thanked his Northern confreres for their hospitality and kindness, thanked Mr. Lamont and his colleagues at the laboratory for the demonstration in the afternoon and concluded his remarks by thanking Mr. Kerr and Mr. Timoney for the excellent paper and opening.

Captain J. M. Crowe (Offaly) observed that he believed Mr. Kerr to be on the right road, for in his experience, dead or partially killed vaccines gave good results. A vaccine killed with chinosol had been particularly successful. He thought that Mr. Kerr should continue his search for a suitable vaccine but would also like to see an experiment carried out to test the value of wheat-germ oil because he believed, according to Mr. Kerr's statement, that the changes taking place in serum albumen and serum globulin might have something to do with abortion. Were they the results of, or the cause of abortion? Mr. Timoney had stated that no vaccine could reach the placenta and that the changes taking place occurred in the chorion. If no vaccine could reach those places how did *Br. abortus* get there? Consequently, where the bacilli could go, so could the vaccine. Captain Crowe also said how much he had enjoyed the visit and that he was very interested in the demonstration of the pig house and the production of nembutal anaesthesia in a pig. He remarked that he was very sorry to see so few practitioners present.

Mr. H. G. Lamont (Belfast) paid tribute to both Mr. Kerr and Mr. Timoney for the paper and opening, saying that the work was a considerable contribution to the data on abortion. He thought that a number of Mr. Timoney's questions were very difficult, if not impossible, to answer, and doubted very much if Mr. Timoney really expected an answer. Haphazard experiments on abortion on any farm were really of little value. Tests of any vaccine had to be rigidly controlled. Mr. Lamont was of the opinion that vaccines and wheat-germ oil were of very little value but he would like to see wheat-germ oil given a thorough test. Results of an experiment should always be published even though the results were negative: negative results were often almost as valuable as positive results. Mr. Lamont thought that any system of eradication in Northern Ireland would never be attempted because of excessive cost of any scheme and the tremendous number (upwards of 70,000) of small farms of about 30 acres. The only hope for abortion would be the discovery of a drug which would be specific in curing or preventing the disease. There were so many anomalies in connection with abortion and opinions were so diverse that a large amount of research work was still required before the abortion riddle would be solved.

Dr. Common (Belfast) said that, not being a veterinary surgeon, he had very little to say but he hoped that the albumen and globulin estimations which he carried out in collaboration with Mr. Kerr would be of some value.

The Reply

Mr. Kerr thanked Mr. Timoney for his excellent opening to the discussion. In connection with Spahlinger's principles he thought it would be very difficult to criticise them: future experiments would show if these principles were right or wrong. The antigenic factors in abortion did not apply to other diseases and any fresh avenue was worth following up. So far as the growth of the organism was concerned, most of it did occur in the uterine fluid, the agar being merely

a starting off point for growth. He found that after incubation for a month or two growth of the organism ceased and since there was no reliable test to confirm whether the organism was dead or alive at the end of the period, formalin in a low dilution was added for safety purposes. An artificial media made from chorionic tissue had been tried but it was found very difficult to prepare since proteins precipitated and were filtered out. Mr. Timoney had asked if the strains used had been typed (tested for virulence). These had not been typed but for experimental purposes freshly isolated cultures had been used so as to ensure the virility of the strains. The heifers were confined to the same paddock all the time so that there was a possibility of reinfection, but that would of course apply to both control and vaccinated animals. The reason for using only a small number of animals was purely because of the expense incurred. The calf of B8 which showed active agglutination at birth was bled on the day of abortion—probably a few hours after birth although the exact time was not known. Mr. Kerr concluded his reply by thanking the members for their attendance and for the good discussion.

PROFESSIONAL ETHICS FOR PHARMACISTS

At the recently held conference of the British Pharmaceutical Society in Edinburgh, a code of ethics for pharmacists was discussed. Among the other provisions of the code, it is laid down that if a dispenser detects an error in a doctor's prescription it is his duty to protect the interests of his customer and also the reputation of the physician by conferring confidentially with the physician. The code, which was drawn up by the Tees-side branch of the society, was approved by the conference subject to confirmation. Pharmacists are forbidden by the code to discuss with patients the composition of medicine, and are enjoined to take every precaution to safeguard the public from poisons and all habit-forming drugs, and to use no exaggerated claims for medicines.

In a report on the headquarters of the society in London, it was stated that the society has occupied its present premises in Bloomsbury Square for 97 years, and that the growth of membership in recent years has been so rapid, now having reached 24,000, that the space available is inadequate. The foundation-stone of a new building will be laid within the next few months. The new site has a frontage on Brunswick Square of 237 ft., and the estimated cost of the building is £310,000.

* * * * *

Dr. Roy Mills, sheep disease specialist in the California State Department of Agriculture, is not easily upset when it comes to peculiar antics of sheep, but he was completely baffled when he surveyed the unusual conduct of sheep on a ranch on the Stockton road seven miles south of Sacramento. The sheepmen had sent for expert advice. All the animals in a particular pasture seemed crazy. They would suddenly drop to the ground, endure a brief bit of agony, squirm and roll for a few feet and then suddenly recover. He discovered the ground was charged with electricity and the sheep were being stunned by electricity in the wet soil. Further investigation showed that power was leaking from a near-by transmission line.—*Meat Trades Journal.*

The Tick Problem*

JOHN MACLEOD, D.Sc., PH.D.,
The Cooper Technical Bureau, London

The British sheep tick, *Ixodes ricinus* L., has been the subject of very considerable investigation during the last 40 years or so, but, until the beginning of the present decade its full significance as an economic factor in sheep husbandry was not realised. The recent researches of the Moredun Institute on louping ill and tick-borne fever, and of Lyle Stewart on a pyaemic condition, associated with tick infestation, in lambs, have revealed that this parasite is responsible, and has probably long been responsible, for a much greater proportion of the high annual losses occurring in hill flocks than was previously suspected. These investigations have tended to focus attention on the tick, and on tick infestation, to an extent that the impression might well be gained of the problem of tick infestation being a recent development.

The Problem in Long Established Areas

It should be understood, however, that severe tick-infestation of sheep was known at least 50 years ago, and there is no evidence that, over the tick-infested country as a whole, the density of ticks is continuously increasing. Individual farmers assert that the ticks on their farms have increased within their recollection; other farms are known, however, where the tick numbers have undoubtedly decreased. Critical examination within recent years has failed to reveal any consistent trend of variation in either direction from established levels. Serial tick counts throughout the spring infestation period have been made on different farms during the last nine years, and the following figures, selected from these, are of interest. They represent the highest infestations (average of several sheep examined), obtained in each series of examinations.

	1931	1934	1935	1936	1937	1938
Selkirk ...	49	—	49	—	46	—
Northumberland	—	—	106	60	79	51
Perthshire ...	—	39	—	—	—	46

It may be accepted that, as a general rule, in areas where tick infestation is of long standing, the tick population level fluctuates about a constant value.

The control of this value may be essentially biotic—*e.g.*, a host factor—vegetational, physical—due to the climate in the vegetation layer occupied by the ticks—or may be affected by a combination of these different classes of

* Written in response to an invitation addressed to the author by the Editorial Committee, N.V.M.A.

factors. Much work requires to be done on this problem of typical, or normal, tick infestation.

Incidentally, the contention that, given a suitable breeding ground, the tick population will be directly proportional to the number of available hosts (Moore 1938), is unjustified either by the evidence of existing tick infestation levels or by homology with the known phenomena of population increase in parasitic or predator species. Whatever may be the factor governing the population, and it is still unknown, the level is certainly not directly proportional to host density.

Control measures in the typical tick areas are confined to protection of sheep, or, at most, to attempts at reducing the tick population to relatively low levels. There is little or no hope that the tick can be eradicated from these areas (see later section on controlling factors), but recent investigations afford ground for optimism that a considerable degree of protection of sheep can be achieved by the use of dips specially designed for the purpose (Stewart 1936). A consideration of such measures is rather outside the scope of this note, more especially as a full account of recent work on this subject is shortly being published.

The Problem in New Areas of Infestation

There is no evidence that the level of tick population, over the country as a whole, is increasing. A species may, however, increase in two directions: in addition to increasing in density in territory already occupied (vertical increase), it may extend its range of territory (horizontal increase). Where fresh territory is invaded, the numbers will also continue to increase vertically until the population comes into equilibrium with the environment. A number of instances of such horizontal increase, in the case of the tick, have been reported in recent years, on to areas fringing tick-infested districts. The tick problem described by Moore (1937) in Kincardineshire area appears to belong to this category.

This type of infestation problem involves rather a different set of questions from those raised by the classical type. It is not here a question of what established factors are operating over the years, but what factors have recently ceased, or newly begun to operate. Because of its novelty, tick-invasion of new territory is apt to receive a disproportionate publicity, but essentially it is a relatively unimportant phase of the tick problem, on account of its limited and infrequent occurrence and because the area involved is usually negligible in proportion to the amount of ordinary tick-territory. Considerable misconception exists of the possible dangers from, and appropriate measures for, such invasion, and

TYPES OF TICK GROUND

Fig. 1.—Typical tick-infested country (Scottish Highlands). Heather, grass and moss over peat.

Fig. 2.—Typical tick-infested country (Border countries). Coarse grasses forming a dense mat.

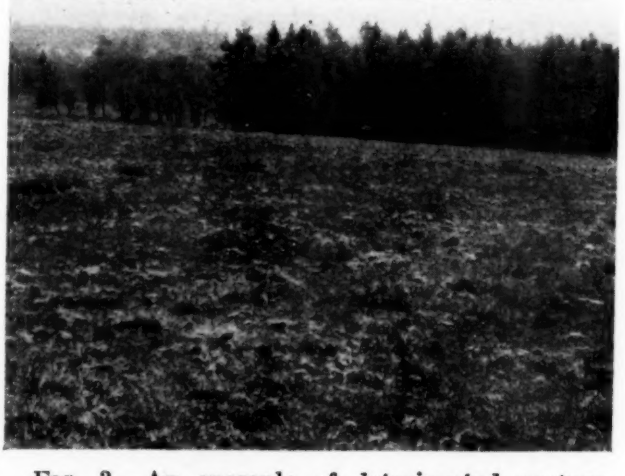

Fig. 3.—An example of deteriorated pasture, which had begun to support a precarious tick-population. A tractor armed with long spiked wheels has been driven over this field to tear up the moss and matted herbage. The photograph shows the tufts of moss torn up and left to wither on the surface. This operation was followed by liming.

it is proposed therefore to discuss this aspect of tick-activity in some detail.

Before the possible significance of such invasion can be appreciated, and control measures be decided on, it is necessary that the factors governing tick-spread and tick-survival be properly understood. The complete complex of interrelations between the tick and its animate and inanimate invironments has not been fully unravelled, but certain salient facts have been discovered which throw considerable light on the nature and role of the factors influencing ticks, and make it reasonably certain that the limiting factor to successful tick-migration is essentially physical in nature.

Spread of Ticks

The problem divides into two main aspects—spread of ticks, and survival of those spread ticks on their new territory. Spread is practically entirely by means of hosts. Neglecting for the moment the question of survival of ticks brought on to new territory, it is clear that the actual spreading of ticks will be governed by the movements of hosts. All animals, although they may migrate occasionally over long distances, spend the most part of their time in definite territories, and the extent of an individual's territory, with the exception of that of certain predaceous birds, is rarely more than a few miles. Apart from subsequent establishment spreading will occur through host-territories overlapping infested and clean areas. That is, spreading will be to areas contiguous with tick-infested areas. The establishment of infestation in isolated areas, cut off by several miles from tick ground, is unlikely, even where conditions are suitable for survival of imported ticks, for it is rarely that two such separated favourable areas are included in the normal territorial range of a single individual host.

It is to be understood that this analysis applies to spread as a continuous process in nature. Discontinuous spreading, through droving or transport of sheep, or migrational movements of wild life, may occur at any place, and if conditions are suitable for survival of the dispersed ticks, may result in isolated foci of infection occurring. The chances of multiplication of ticks in such foci are, however, slender, even under physically favourable conditions, for few if any of the hosts which pass over such a focus, in their normal intra-territorial movement, have any gorged ticks to return to the focus in place of those they remove. The initial concentration thus becomes dissipated over a wider and ever wider area, with a correspondingly decreasing chance of the sexes meeting on the host, and reproduction occurring.

Survival of Ticks in New Territories

It was seen above that potential spread, *i.e.*, the scattering of ticks on to clean ground, occurs as a continuous process only on the fringes of existing tick-territory. The fate of such "colonist" ticks will depend on their ability to survive in their new country.

Moore gives as three factors important for tick survival: temperature, humidity and food supply. Actually, only one of these, humidity, plays an important part in determining whether ticks will survive or not in this country. The tick can feed on such a variety of hosts that there is never any danger, in nature, of the host factor preventing survival (MacLeod, 1934_2). Conversely, presence of an ample food supply does not necessarily determine the establishment of introduced ticks. As pointed out above, foci which do not in their early stages receive frequent reinforcement from reservoir areas, *i.e.*, foci at considerable distances from the main areas, are in danger of being dissipated through horizontal spread, since the vertical limit, the population level, will consequently suffer. Even in new foci, at the periphery of existing areas of infection, where regular replenishment could make up for losses by dissipation, the food factor is not the principal factor determining successful establishment, but the microclimatic conditions, as shown below. The statement that "when a parasite with no known natural enemies invades fresh territory then the pest survives and multiplies so long as there is food available" (Moore, 1937), is not in agreement with the recognised principles of insect ecology, and is demonstrably untrue in the case of those ticks annually imported into the Lothians of Scotland and other low-ground sheep farms.

Temperature may, occasionally, affect the species by low extremes, but its chief role is an indirect one in that it affects the susceptibility of the species to low humidity.

Humidity is the all-important factor in the life of the tick. Its moisture requirements are unusually high; except during winter low temperatures neither the unfed nor the gorged tick will survive more than a few days under ordinary air conditions in this country, and during the summer months the species requires almost saturated air (MacLeod, 1934b, 1935). Microclimates, *i.e.*, the immediate surroundings of the tick, fulfilling the necessary moisture conditions are found only in certain vegetational types, namely, a deep or matted layer of vegetation—which remains present through out the summer—over acid soils in which the soil-water level remains near the surface throughout the summer. Such conditions are characteristic of rough hill-grazings, and they are seldom met with under conditions of cultivation.

It might be mentioned here that tick activity is a distinct and separate problem from tick survival. Survival is determined in this country by microclimatic humidity, but activity is determined by air temperature. Humidity has no effect on activity, beyond the indirect one of affecting duration of life. Confusion of these two aspects of the problem, in Moore's article (1938), has led to the surprising statement that the humidity over peaty soils results in a continous summer activity in north-east Scotland.

Since spread—the scattering of ticks beyond the boundaries of their existing territory—is due to hosts whose territorial ranges overlap both infested and clean ground, it is clear that a continuous process of spreading must be maintained during the active tick season at the periphery of an infested area. Established patches of infestation in a uniformly favourable area grow by accretion, as it were, and it is only reasonable to suppose that in districts where ticks have been long established, they will in the course of the years have extended over the whole of any continuous favourable area. Similarly, they must, throughout the years, have been spreading unavailingly beyond the limits of each area into the immediately fringing unfavourable areas. It follows that where recent extension of tick territory has occurred, the explanation must be sought in a change towards conditions favourable for survival of such extra-marginal ticks, *i.e.*, in a development of vegetational conditions away from the cultivated types and towards a heath or moor type.

Control and Prevention of Tick-Invasion

Control of tick-invasion, and prevention of further invasion, will therefore lie in the correct management of pastures marginal to tick-infested hill ground. It is beyond dispute that since the post-war depression in agriculture commenced many pastures have been allowed to deteriorate sadly. Moss has established over souring soils which have been deprived of their necessary feeding; continuous selective grazing by one type of stock has allowed of tufts of rejected grass remaining year after year, and, gradually, conditions on such pastures have approached those required for survival of ticks. Where such a gradually deteriorating field is within host-range of tick ground, the mortality of introduced ticks begins gradually to sink from the initial 100 per cent. until finally a sufficient percentage of introduced ticks succeeds in surviving and moulting to cause an appreciable infestation of the stock on the field, and an outcry is then raised that tick invasion has suddenly taken place. Actually, it has been taking place year after year, but only now has the percentage survival risen high enough to attract notice.

The immediately obvious remedies are (1) mixed grazing, (2) severe harrowing to tear up the moss, (3) liming, and (4) reduction of cover by burning or cutting. These measures are only effective because conditions are already rather unfavourable for tick survival, and exact a heavy mortality. The further weighting of the chances against the tick, by application of these measures, should be sufficient to exterminate infestations which are only precariously established in face of naturally rigorous conditions. Until the pastures have been brought back to proper order, further reinforcements of the invading ticks from reservoir areas should be prevented as far as possible by ridding sheep of ticks before putting them on to the pastures in question. This is easily effected by almost any of the standard sheep dips, but, where safety of dipping is an important consideration, as for instance with unusually susceptible sheep, such as rams or fattening sheep, or with valuable pedigree animals, a dip of vegetable origin, such as a derris or pyrethrum preparation, is ideal.

A word of warning might perhaps be given here about the use of derris for tick control. Derris is a plant, the toxic qualities of which reside in a rather complex group of substances collectively referred to as derris extract, or derris resin. Since the total extract content of the root depends on (1) the variety, (2) the strain within the variety, and (3) the method of cultivation, while the chemical content depends mostly, if not entirely, on the strain of plant, it is essential to consider the amounts of ingredients in the extract, and not the root (Cahn, Phipers and Boam, 1938). The amount of extract may vary from 10 to 30 per cent. In the extract of normal commercial roots the amount of rotenone, which is the principal toxic substance, may vary from 15 to 45 per cent. In view of these facts, it is of little use to give as a standard a bath concentration expressed in terms of root, and the strength of 1 in 500 derris given by Moore is therefore of no comparative value.

Control of Tick Infestation by Interference with the Balance of Hosts

Heavy tick infestation of hosts other than sheep has led to the popular acceptance of the belief that by removing such hosts the tick numbers can be much reduced. This is probably true in the case of a host such as the hare, which may overrun a moor, and may indeed be the principal means of sustaining the tick population there. There are grave dangers, however, of this principle being wrongly applied unless the facts of each host-relationship are carefully examined, and such measures should

not be undertaken without the advice of competent ecologists. Thus, it has been advocated that the native red deer should be exterminated, as constituting the greatest problem in tick control, and the proposition has been advanced that, apart even from sheep interests, it is a case of either deer or grouse—one or other must go, for if the deer are left, the grouse will be killed by ticks. Neither thesis will bear examination, and it is unfortunate that a policy with such serious consequences should be advocated without critical consideration, for its weakness will rather tend to discredit the otherwise laudable efforts of its sponsors to control a serious agricultural pest.

It is well to be clear first as to the object of the measures. If it is intended, in face of our present knowledge of the situation, to attempt the extermination of ticks from deer forests and hill-sheep grazings, further comment would be futile. If, on the other hand, it is intended only to keep down the numbers of ticks, the following considerations should be borne in mind. Deer must necessarily play an unimportant part in maintaining the tick population even of a deer forest, where they normally live. The only precise figures for deer density in this country are those of Darling (1937), who found in Wester Ross—one of the most densely populated deer tracts in Scotland — densities of from one deer to thirty acres, believed by Darling to be too high, to one deer to a hundred acres. Tick infestation of deer may run to 500 or in extreme cases nearly 1,000 females per deer, but the explanation of these high figures should be obvious to those acquainted with the habits of deer. These animals lie resting, in mild weather, for most of the forenoon and afternoon, much more so than do sheep, for instance. Further, they occupy the same favourite resting places day after day and some times year after year. It follows that gorged ticks will tend to be concentrated in these lairs, and will immediately find a host when they have moulted. Thus, the tick population of a deer forest is as it were concentrated to a high degree on the deer. By far the greater number of the ticks attached to deer are picked up in their lairs, and most of them are dropped there when gorged. The position is almost analogous to that of sporting dog infestation, where the dogs range the moors but have their own private dog tick infestation, the ticks — *Ixodes canisuga* — alternating between the dogs and the kennels. Deer may well have a very high infestation, because of their habits, yet play little part in affecting the general level of tick population on the ground over which they range.

Even were this concentration effect not present, so that the deer scattered their ticks equally over the pastures as do sheep, their influence would still be less than that of a normal sheep population. Assuming the deer density to be one to fifty, and the average infestation at a given time to be 500—which is very doubtful—that means that only ten ticks per acre are fed by deer at this time. Actually, of these ten the majority would be concentrated in one or two lairs for every fifty acres.

In the case of sheep grazings, the role of deer is quite unimportant. Even an extremely light sheep stocking markedly lowers the grazing capacity of a deer forest from the point of view of deer, and, on ordinary sheep grazings, deer occur only as sporadic raiders, seldom staying overnight on the ground.

So far as cultivated areas fringing tick-territory are concerned, the deer may be dismissed from consideration as causes of tick spread. The summer territory of the deer herds is on the high tops, and it is almost entirely in severe or wintry weather, when tick infestation of deer is at its lowest, that they raid the areas of cultivation. When conditions on their ground are favourable for tick activity, so that their infestation is relatively high, these same conditions induce them to remain on their own territories.

The position may be summed up as follows. Deer infestation is regarded as important only from the point of view of the danger of their maintaining ticks on grouse moors, or bringing ticks on to sheep grazings. On grouse moors the role of resident deer, relative to that of grouse, hares and vermin, is unimportant, for they cannot possibly broadcast many gorged ticks per acre, on account of their low density, and their habit of concentrating their own tick populations in deer lairs. Raiding deer are unimportant because of, (1) the fact that raiding usually occurs outside the active tick season, (2) the short duration of their stay or passage, and (3) the infrequency of deer migrations from their individual herd territories.

For these reasons it should be self-evident to an intelligent observer that, where deer and grouse occur together on tick-infested moors, the removal of deer from the moor cannot be expected to alter materially the tick population level on the general pasture. The policy of wanton and wholesale slaughter of the native herds of red deer, which is already in force in some areas, is quite indefensible.

On sheep moors, and in areas of cultivation, deer must have even a more negligible effect on the tick population than on grouse moors, for they occur only as sporadic raiders, and then usually in the winter months, when their tick infestation is low. An obvious argument in

(*Concluded at foot of col* 1, *p.* 1250.)

CLINICAL COMMUNICATION

Extraordinary Resistance to Infection

JOHN D. PEELE, M.R.C.V.S.,
DURHAM

The subject was a four-year-old Bull bitch, whelping her second litter. The bitch had started labour on the morning of Wednesday, July 27th. The owner called me in on the Thursday morning.

Examination showed a dead puppy wedged in the pelvis with the head back. As there was considerable swelling of the vagina, more or less complete uterine inertia, and as the bitch obviously had a number of puppies, it was decided to perform a Caesarean section without further loss of time.

The bitch weighed about 45 lb.; 6 c.c. of nembutal was injected into the radial vein. Anaesthetisation was not quite sufficiently deep so a little chloroform was administered by means of a Wright's mask. When the bitch was fully anaesthetised the mask was removed and the operation completed with the nembutal.

The body of the uterus was very much distended and as soon as it was touched it ruptured. A certain amount of the fluid contents escaped into the peritoneal cavity before it could be packed round with cloths. The puppies, six in number, were extracted and also the foetal membranes, and the peritoneal cavity cleaned up as much as possible. The uterus and the abdominal muscles and skin were then sutured. The owner took the bitch home that night and four live puppies.

The puppies when removed showed very little life, but each one was well rubbed with a dry towel and with a little artificial respiration very soon began to cry lustily. The effect of the anaesthetic seemed to pass off the puppies in about ten minutes. Probably about 20 minutes elapsed between the bitch being given the nembutal and the puppies being removed from the uterus. The puppy wedged in the pelvis was dead and one other never showed any signs of life.

The next day the bitch was walking about, eating and her temperature was 102°. She continued to progress until Monday, August 1st, when a message was received to say that she had jumped on to a chair and the wound opened and something was hanging out of it. Two of the central skin sutures had torn out and a piece of omentum about the size of a hen's egg was protruding. This was cleaned in an antiseptic solution and returned. All the catgut sutures in the abdominal muscle had torn out leaving an unhealed gap of about 2½ inches. Two deep silk sutures were put through skin, muscle and peritoneum. Seen on Wednesday, August 3rd, the bitch was quite happy, her temperature was normal and she was eating well. The rest of the skin sutures were then removed and the two deep sutures were extracted on August 8th when complete healing had taken place.

The resistance of this bitch to peritoneal infection was extraordinary: after the operation her temperature never rose above 102·5°. It will be interesting to see what adhesions can be felt in six months' time.

On September 3rd the owner reported that the whole family was still flourishing.

---

support of this is that, in Northumberland and the Scottish Borders, where there are no deer, the tick-infestation level is actually higher than in the Scottish Highlands, over which the deer roam at will.

REFERENCES.

CAHN, R. S., PHIPERS, R. F. and BOAM, J. J. (1938.) *J. Soc. Chem. Indust.* **57.** 200.

DARLING, F. F. (1937.) A Herd of Red Deer. Oxford Univ. Press. Lond. Humphrey Milford.

MACLEOD, J. (1934a). *J. Anim. Ecol.* **3.** 161.

———. (1934b.) *Parasitology.* **26.** 282.

———. (1935.) *Ibid.* **27.** 123.

MOORE, W. (1937.) *Scot. Farmer.* Oct. 2, 1937.

———. (1938.) *Vet. Rec.* **50.** 1031.

STEWART, W. L. (1936.). *J. Roy. Agric. Soc. Eng.* **97.** 81.

HIGHER EDUCATION IN EAST AFRICA

The Colonial Office has announced that the Duke of Gloucester will cut the first trench on the site of the new Makerere College which is to be built in Uganda. The establishment of this new higher college, which is designed to provide advanced education for Africans mainly from Uganda, Kenya, Tanganyika Territory, and Zanzibar, was one of the chief recommendations of the commission on Higher Education in East Africa which recently visited East Africa under the chairmanship of Lord De La Warr. The ceremony, which will take place on November 3rd, will mark the first step in the erection of the college buildings, the cost of which will be in the neighbourhood of £200,000.

The Commission felt that an effort must be made to meet the growing African demand for higher education by founding in East Africa a college which could reach full university status within a reasonable time. They also considered it the duty of the East African Governments to make higher educational facilities available within British East Africa. One of the first results of such a project would be to enable Africans to qualify themselves to take larger share in the government of their own country, particularly in the important professional services—medicine, veterinary science and agriculture.

The Veterinary Record

September 24th, 1938.

Delayed Reactors to the Double Intra-dermal Test

THE article by the Chief Veterinary Officer of the Ministry of Agriculture and Fisheries on the frequency of delayed positive reactions to the double intra-dermal tuberculin test in cattle is short but important. It shows that in cattle not previously tested a not inconsiderable number will show a delayed reaction at 120 hours although negative at 72 hours. Several veterinarians have made observations of this nature and the present article establishes the fact beyond dispute, for the results with more than 17,000 cattle, of which over 5,000 proved to be positive, are correlated and analysed. In the light of these results it has naturally been decided that cattle tested in the projected tuberculin test survey of self-contained herds are to be examined finally after 96 hours and not after 72 hours as heretofore. Practitioners will no doubt similarly modify their procedure in other initial tests. Fortunately the number of delayed reactors in herds that have previously been tested appears to be negligible and hence there will be no need to alter the times of the readings in the double intra-dermal tests carried out on tuberculin tested and already attested herds.

We have always held that a centralised veterinary service should lead to useful additions to our knowledge, if advantage is taken of the facilities available for the collection and publication of data, and we readily congratulate the Chief Veterinary Officer upon this early demonstration of his intention to benefit veterinary science in this way. We hope that the lead thus given by him will be followed throughout the Service.

REPORT

[**A Report on the Conditions of Animal Production in Australia.** By J. Hammond, M.A., D.Sc., F.R.S. Published by Council for Scientific and Industrial Research, Commonwealth of Australia, Melbourne, 1938. Pamphlet No. 79.]

This is a report made by Dr. Hammond during a visit to Australia relating to Beef Cattle, Dairy Cattle, Pigs, Lamb and Mutton Sheep, and Research, Education and Extension Work.

In a general introduction, the author points out that great progress had already been made in developing some aspects of Australian animal production, and problems which seemed insuperable have been overcome. A tribute is paid to the veterinary services for the work done in dealing with contagious and deficiency diseases.

The peculiar climatic conditions of the greater part of Australia have had a profound influence, and will probably continue to have such influence, upon the type and quality of its animal products. There is, following the rains, a very rapid growth of luscious herbage, but this is comparatively quickly exhausted and first-class grazing all the year round is not possible in many areas. Such conditions as these are particularly suitable to annual rather than to perennial plants. Notice is taken of the improvements in crop production which have been carried out, and the suggestion is made that as in so many other tropical areas there is a need for the exploitation of further leguminous herbage crops.

The alternating extremes of drought and rains influence the plants used for stock feeding to produce a set of circumstances which are favourable to the production of food animals which can be finished quickly, such as fat lambs in 14 to 16 weeks. In areas where there is a longer period of growth and succulence, fat cattle can be produced taking about 20 to 30 weeks, while in particularly favourable districts, dairy farming can be practised for about 40 weeks in the year. Further study of temperature-rainfall-herbage relationships is suggested as a means of demarcating more clearly the areas where one or the other type of livestock-production should be encouraged or introduced.

Beef Cattle.—It is pointed out that dairying, which gives a much quicker return on capital, is gradually encroaching upon areas which are suitable for, and were formerly employed for, fattening beef cattle. For this latter purpose a better class of land is needed than for purely breeding, but owing to the restrictions imposed on available fattening land by dairying, the tendency now is to fatten cattle more upon the

same areas where they are bred. This puts the industry under a handicap, for feeding stuffs have to be imported or cattle have to be moved (in times of drought) with consequent extra cost. Long distances to travel to the processing centres make it impossible to utilise young fat-stock, and result in a wastage in more mature cattle when these must travel by road or rail.

The bulk of the beef is consequently old and the animals are of poor general conformation, and while it may supply a large quantity of the cheap frozen product, it can never compete with Argentine beef.

A suggestion is made that Australia might explore further the possibility of using an infusion of Zebu blood for the hotter territories, especially in Queensland and Western Australia.

A marked difference in quality was observed between the bulls bred upon the high-class pedigree breeding establishments and those kept upon commercial producing farms. The establishment of specialised bull-breeding farms in the beef-breeding areas, to form a supply of better class animals, is advocated.

A modicum of cross-breeding is also urged even on the establishments where only one breed is normally maintained. It is pointed out that the cull cows of the Shorthorn breeding farms, for example, might readly be put to an Aberdeen-Angus bull to produce first-cross calves which would be sold off.

Recommendations are made that more attention should be paid to the production of high-quality "vealers" (killed at eight to ten months, and yielding a 350 to 400 lb. carcase). It is pointed out that the British market could probably absorb a considerable amount of this product. It is not supplied to London from abroad, and in the spring and summer months there is a ready demand for a lighter and smaller joint than is given by the older and more mature animal.

Australian conditions would appear to be such that they could produce considerable supplies of this type of animal product. The cows would require to be calved down about a month before the flush of grass growth was reached, and the calf would benefit from the increased flow of milk which would result. The duration of the growing period would determine the age at which the young animal would be marketed. Any steps taken to conserve fodder, either as hay, silage, or by other means would aid the same end.

Dairy Cattle.—Certainty of an adequate and well-distributed rainfall, and the long herbage growing period which this entails, or alternatively a satisfactory system of irrigation, are essentials for success in dairying. Time of year of calving in relation to the periodic growth of grass, influences the degree of yield (in terms of either milk or butter), while the need for supplementary feeding bears a relationship to costs of production. Cows should calve at the optimum period in each district in relation to local conditions: this can usually be determined only by *ad hoc* experimentation.

It is noted that hay and silage are conserved by the more progressive producers, and might with advantage be extended to the rank and file. Supplementary foods (maize, lucerne, early oats, are suggested) should be further encouraged, while modern pasture management seems to deserve great attention. Similarly, the principles of feeding according to individual yields should be further extended.

Practices to be encouraged also include the dehorning of calves and the construction of narrow concrete pathways from steadings, etc., to avoid undue soiling with mud in wet winter weather.

With reference to diseases, it is noted that contagious abortion and mastitis take a heavy toll, and the suggestion is made that an investigation of the causes of wastage and replacement might well repay effort and point out the lines along which future research programmes might be constructed. It is noted that bovine tuberculosis is of such low incidence that it ought not to be difficult to eradicate, with benefit not only to human health and the dairy industry, but also indirectly to the pig industry.

The need for further extension of the practice of milk and butter-fat testing among dairy farmers is urged, so that farmers may have a more accurate standard of production to aid them in progressing towards economic success. Australia apparently possesses a "lamentably small" number of tested herds.

The excellent practice of basing the price of a dairy bull upon the butter-fat record of his dam is praised. Progeny recording is also in vogue among some of the more progressive farmers, and could with advantage be extended.

The question as to whether an attempt should be made to regulate the localisation of breeds to specific districts is considered. It is pointed out that two main factors affect the question. These are:—

(*a*) The suitability of the size of the breed to the local soil conditions. Low lying rich fertile soil supports a large heavy cow, while thin sandy soil will only support a small type of cow. It may be necessary to envisage a difference in type within a breed as well as different breeds.

(*b*) The nature of the product—whether fresh milk, butter or cheese. The breeds producing a rich milk would naturally do best in butter producing areas, while cows producing a large amount of milk of a lower butter fat content are better where fresh milk or cheese is to be produced.

Details regarding local organisation relating to butter and cheese making are briefly considered, and it is pointed out that the dairy farmer who can provide himself with an alternative product, such as pigs, is in a better position to withstand the shock of violent fluctuation of world butter prices, than those who depend entirely upon dairy products.

Dairy bye-products, such as skim-milk, etc., are well suited for utilisation by pigs, and when it becomes uneconomic for butter to be produced steady production of milk can be continued to be fed to the pigs. Immediately the price becomes stabilised again, butter or cheese making can recommence.

The suggestion for State Dairy Husbandry experts working under the co-ordination of a Federal Officer is made.

Pigs.—High costs of labour and lack of a general scheme of mechanisation of feeding methods appear to be limiting factors to progress in the development of the pig industry. There is room for much greater use of methods which will enable one man to feed a large number of pigs. There are available in different areas several kinds of bye-products which could be better utilised.

Both bacon and pork could be produced by Australia, and the following principles govern the choice.

(*a*) *Production.*—Pork is more suitable for grassland areas where few cereals are grown and where dairy bye-products are usually available. Pork is marketed at low weights (60 to 80 lb. and 80 to 100 lb. carcase weights), and requires higher protein equivalent feeding, which can to some extent be supplied by milk products. Bacon pigs must produce heavier carcases (*e.g.*, 135 to 170 lb. weight), and at the later feeding stages do not require such a high protein in the food. This type can therefore be produced more economically in areas where there are cereal bye-products available. Dairy products or meat meals would be needed for the younger stages of growth and for the breeding stock.

(*b*) *Marketing.*—In the British market, only New Zealand (and Australia) sell pork to any extent. Bacon is, however, supplied in large amounts by Denmark, Sweden, Holland, Canada, etc., and is of a far higher general level of excellence than that which Australia could supply.

Frozen carcases (instead of cured bacon) are being sent from Australia, and after arrival in Britain are defrosted and cured in this country. This allows factories to maintain output during times when home supplies of bacon are short (April to July), and is an advantage. The greatest need at present is for a distinct improvement in the quality of the Australian product.

It is noted that the Australian bacon carcase is only about 100 to 120 lb. as at present produced, while the British market requires carcases of about 135 to 169 lb. To effect a degree of improvement some such encouragements as payment on a quality basis; carcase tests of progeny of breeding stock; and especial attention paid to breeding the right kind of animals (whether pure breeds or cross breeds), are needed. A greater uniformity should also be encouraged. To supervise these innovations an expert pig officer is recommended, who should have had experience in other countries of methods which have been found successful (*e.g.*, New Zealand and Canada). He would have many investigations to carry out before criteria which suit all the Australian requirements could be defined.

Lamb and Mutton Sheep.—Australia has achieved pre-eminence with Merino sheep for wool production, but although she has all the necessary conditions for producing mutton and lamb, she has not yet been so successful with these latter products. The author considers that concentration should be upon the production of fat lamb rather than upon the heavier mature mutton. For this he recommends that cull Merino ewes should form the first stratum, these being mated with rams of such breeds as the New Zealand type Romney, Border Leicester, English Leicester, and Dorset Horn. The female crossbred lambs should form the next stratum, being mated when mature with rams of the Southdown type. These would produce lambs of both sexes which would yield a carcase of good conformation, would mature rapidly and be the most useful type for export purposes.

The success of this type of industry would depend very largely upon local conditions of climate and herbage. Some areas are only suited for breeding from the cull Merino, others would be suitable for fat lamb production, and it is probable that success would not attend any schemes which were started in unsuitable localities. Much more knowledge is required concerning the duration of the anoestrous period in different breeds of sheep under Australian conditions.

Many other details are considered which refer to fat lamb production, such as the need for greater uniformity in the use of rams, the reduction of the present large number of different types, systems of grading required, fat lamb competitions, facilities for transport to avoid transit wastage, feeding under drought conditions, the estimate of the feeding under

drought conditions, the estimate of the carrying-capacity of land in terms of ewes, lambs, growing and adult sheep, etc. The appointment of a Commonwealth lamb expert is recommended, who should undertake the co-ordination and planning of the necessary experimental work in co-operation with the State authorities.

Miscellaneous.—The absence of mules from Australia was noted, and it is suggested that since the donkey can acclimatise itself to high temperatures and dry environmental conditions better than the horse, the mule being intermediate, and since mules are so extensively and successfully used in other countries with a somewhat similar climate, they might be useful in Australia. The conditions in many parts are entirely suitable for the rearing of turkeys, and the author considers that the turkey industry should be encouraged.

Research, Education and Extension Work.—A supply of men trained in the fundamental sciences of animal nutrition, physiology and genetics is required. There are but few special courses in these subjects where such men can be trained. The author considers that it would probably be best for these men to be trained in both agricultural and veterinary institutes. He does not agree that they should be restricted to the veterinary institutes only, for he points out that the time and cost of specialised training in veterinary work is such that the numbers of men trained in animal production would be limited, and many of the duties they would have to undertake would make technical veterinary knowledge unnecessary.

A criticism is made of the system of teaching animal production in the Agricultural Colleges. As in many other countries this system is based upon practical management and the rigid outlook, rather than upon the scientific approach making full use of experimental work. A greater use of men who have taken University courses (specialised) in animal production, would do much to change and improve this outlook.

Various matters relating to organisation and extension work are discussed, and some attention is paid to suggested changes in the general administrative control of work to be done in animal production, and the scientific work fundamental to this industry.

The publication contains a great deal of information and for those whose interests are wider than the merely parochial, it will well repay careful study.

The agricultural returns indicate that there are more poultry of all kinds in Scotland this year than there were last year. Increases in poultry were a feature of these returns over a considerable number of years following the War, but the expansion of the poultry industry received a serious check four or five years ago.

ABSTRACTS

[**Tuberculosis in Australia.** Holmes, M. J. (1937.) *Med. Jour. Australia.* **2.** 19. 813-827.]

In this address the author reviews some of the aspects of tuberculosis in man as observed in Australia and indicates the control measures which, in his opinion, should be adopted.

During the 20 years prior to 1887, the death rate from tuberculosis—both pulmonary and non-pulmonary—was steadily and rapidly rising, mainly owing to increased mortality among young adults: since 1887, it has almost as steadily fallen. In 1935-36 the mortality rates per 100,000 persons in the various States varied from 35 to 47 for pulmonary tuberculosis and 2·3 to 10·4 for non-respiratory forms.

The age distribution of tuberculosis mortality in Australia has altered very markedly in the case of males and to a less extent in the case of females, particularly in recent years. Since 1910, the greatest mortality has occurred among females between the ages of 20 and 40 years, while in males the maximum has fallen between the ages of 40 and 70 years. At present, the mortality among men is very much lower than that among women. The reasons for this difference in distribution according to sex are discussed.

The mortality among children under the age of 10 years is accounted for almost entirely by non-respiratory tuberculosis but whereas in other countries such infections are due largely to tuberculosis of the bovine type, in Australia the mortality both among children and adults is almost exclusively due to tuberculosis of human origin. In Australia, however, the mortality rate from non-respiratory tuberculosis is lower than in any other country, the rate being 5 per 100,000 (compared, *e.g.*, with 14 in England and Wales and 21 in Scotland). These statements must not be read as implying that infection with bovine tubercle bacilli is of no moment in children in Australia; such infection is, in fact, by no means inconsiderable, some examinations at Melbourne, for instance, showing that 66 to 71 per cent. of tuberculous infections of the cervical and mesenteric glands were due to tubercle bacilli of the bovine type. Infection in such cases is, of course, undoubtedly due to contaminated milk and it is stated that from the available evidence about 8 per cent. of dairy cattle in Australia are tuberculous. The tubercle bacilli found in bone and joint tuberculosis in children and in all lesions in adults were found to be of the human type—in these particulars also Australia differs from other countries. All the evidence indicates that the mortality from tuberculosis of bovine origin in Australia is now very low indeed, and

that it has declined much more rapidly than the mortality from tuberculosis of human origin.

F. C. M.

* * * * *

[**Canker of the Foot in the Horse.** Schafer and Weischer (1938.) *Tierärztl. Reisch.* **44.** 14 and 15.]

The aetiology of canker of the foot is not known. Various exogenous and endogenous factors have at various times been considered responsible. The writers consider heredity to be by far the most important factor.

Canker is more frequent in cart-horses. There is considerable evidence of the frequent occurrence of the disease in the progeny of particular horses and a number of examples are cited. In East Prussia before the War, the horses used were obtained by crossing imported Clydesdale or Shire stallions with indigenous mares—there was no single case of canker. Later, similar indigenous mares were crossed with Belgian stallions and the condition became of very frequent occurrence.

It is stated that flat hoof in horses is known to be an hereditary defect transmitted as a true Mendelian recessive character. Further evidence is needed with regard to the exact method of inheritance of susceptibility to canker.

Horn quality, hygienic conditions and trauma are undoubtedly of importance when they act on susceptible animals.

It is suggested that animals affected with canker shall be excluded from breeding, stallions being of more importance than mares. In some cases stallions have remained free from disease for 10, 15 or even 20 years although during this time producing progeny susceptible to the disease.

Regarding treatment, the pressure bandage recommended by Westhues, is undoubtedly the most satisfactory. Operative removal of tumour tissue or the application of corrosives or the iron may be needed in addition. A permanent cure is never ensured and there is a high incidence of recurrence after apparent cure.

The annual loss from the disease in Germany is estimated at $5\frac{3}{4}$ million marks!

E. G. W.

* * * * *

[**The Treatment of Staphylococcal Skin Affections in the Dog by Means of Specific Anatoxin, alone or associated with the Administration of Sulfamide Derivatives.** Holstein, G., and Richou, R. (1938.) *Bull. Acad. vét France.* **11.** 3. 158-166.]

The success which has attended the treatment of cutaneous staphylococcal infections in man with anatoxin stimulated the authors to try similar methods in dogs, in which animals such affections are often very refractory.

Preliminary experiments showed that dogs could withstand comparatively large doses of anatoxin, but even so the immunity response was sometimes feeble. Whilst complete recovery occurred in some cases, the results were not comparable to those obtained in man and in some instances failure or relapses occurred. When serological examinations of the dogs treated in this way were made before, during, and after the injections, it was evident that, contrary to what occurs in man and most other animals, natural anti-staphylococcal immunity was practically nil and the development of antitoxin particularly slow. Nevertheless, the authors considered that the good results obtained justify the use of this method for known staphylococcal infections.

In a second series of experiments, the authors tried to reinforce the action of anatoxin by a form of non-specific treatment such as oral, subcutaneous or intravenous administration of "sulfamide" derivatives. Up to the present, only a few cases have been tried but the results are encouraging.

G. D.

* * * * *

[**Orchitis and Epididymitis due to Brucella.** (Trans. title.) Lafenetre, H., and Roman, G. (1937.) *Rev. Méd. Vét.***89.** 700-706.]

This paper is a discourse on the affinity shown by organisms of the brucella genus for the genital glands (particularly the testes) of the male. In man orchitis is the most frequent complication of brucellosis and so regular is it that it may establish a diagnosis in cases of indeterminate pyrexia.

The affinity of brucella for testicular tissue may be shown experimentally in the guinea-pig. Histologically there is first degeneration of the epithelium, then interstitial inflammation with abundant suppuration, and later calcification of the necrosed tissue, which is surrounded by a fibrous capsule. Lafenêtre and Roman found that 15 per cent. of infected guinea-pigs showed lesions of testes, epididymes, or seminal vesicles.

Most natural cases have been described in bulls. Some of these give a grey creamy pus on massage of the genital ducts per rectum. This pus may yield *Br. abortus* on culture. Lafenêtre and Roman quote Buck, Creech and Ladson (1919) who state that they obtained *Br. abortus* in culture from the semen collected from the vagina of a non-infected cow which had been served by a bull suffering from a brucellar abscess in the epididymis. The condition has been produced experimentally by intravenous intra-conjunctival and intra-testicular inoculation of cultures.

In swine the condition is probably of greater importance. Brucella has been observed to

cause an enzoötic among boars in Hungary amongst other places.

In rams, he-goats and dogs the condition has also been described on several occasions.

J. G. M.

* * * * *

[The Susceptibility of the Wild Rat to Infection with Brucella abortus. A Preliminary Note. Bosworth, T. J. (1937.) *J. Comp. Path. and Therap.* **50.** 4. 345-349.]

Five out of twelve wild rats showed definite evidence of *Br. abortus* infection when killed at intervals varying from 23 to 57 days after being fed on infected guinea-pig spleen. When the experiment was repeated with nine other rats, six contracted infection. Many of the infected rats showed no obvious disturbance of health.

The isolation of *Br. abortus* from the kidney in one rat, and from the epididymis in another suggested that the organism may be excreted by infected rats through the urogenital tract. In view of this the writer tested the urine and faeces and in one out of ten rats the urine was shown to be infective. The faeces were negative. One out of seven composite samples of urine and faeces was also shown to contain *Br. abortus*.

In a further experiment on the transmission of infection it was shown that infection may pass from rat to rat when housed in close contact.

Bosworth also examined two batches of rats caught on farms where *Br. abortus* infection was prevalent among cattle. One batch of over 40 rats were all negative but in another batch of three rats, *Br. abortus* was recovered in one instance. The writer hopes to continue his investigations when further rats are forthcoming.

G. D.

* * * * *

[An Outbreak of Bacillary White Diarrhoea in Turkeys in Italy. (Trans. title.) Barboni, E. (1937.) *Clin. vet. Milano.* **15.** 10. 597-613.]

An infectious disease of young turkeys' five to ten days old is described in which the chief lesions were catarrhal enteritis, myocarditis, enlargement of the spleen and the presence of greyish yellow nodules in the liver. A Gram-negative organism was isolated in pure culture from the liver, bone marrow and heart blood, which on cultural and biological examination showed itself to be *Salmonella pullorum*. Feeding 2 c.c. of culture to young turkeys and chickens produced typical symptoms of bacillary white diarrhoea. It is suggested that the disease is chiefly transmitted through the egg and that one of the most important steps to take in its eradication, is to eliminate adult turkeys carrying the infection.

J. A. N.

N.V.M.A. DIVISIONAL REPORTS

Royal Counties V.M.A.*

Meeting at Oxford

COLONEL GREENFIELD'S PRESIDENTIAL ADDRESS

An ordinary General Meeting of the Royal Counties V.M.A. was held at the Clarendon Hotel, Oxford, on Friday, April 29th, 1938. The President, Col. H. Greenfield, occupied the chair, and the following members were present: Major W. H. Anderson, Messrs. L. Guy Anderson, N. S. Barron, J. R. Baxter, H. Bell, Capt. H. B. Collet, Mr. J. A. DeGaris, Major R. C. G. Hancock, Mr. E. J. Heather, Capt. A. A. Kidd, Capt. W. L. Little, Mr. J. W. McIntosh, Mr. G. P. Male, Mr. W. Martin, Vety. Lt.-Col. Rees-Mogg, Mr. H. C. Shingler, Lt.-Col. P. J. Simpson, Major F. J. Taylor, Col. G. K. Walker, and Mr. F. W. Willett.

The minutes of the November Meeting, having been published in the *Veterinary Record*, were taken as read. Lt.-Col. P. J. Simpson asked to be allowed to raise a point before the minutes were approved and signed. On receiving the President's permission to do so, he asked, "Could the matter of the recommendations of the organising committee of the N.V.M.A. with regard to the running of R.S.P.C.A. free clinics, be reopened for discussion, not necessarily to-day?" The President enquired if Col. Simpson would state a reason for his request. Col. Simpson then said that some of the members who had been present at the meeting were not in agreement with the resolution which had been passed, but the time for discussion had been so limited that it had not been possible to discuss the matter then.

Col. Walker (who had been in the chair at the November meeting) said that as far as his recollection went, a resolution had been proposed and rejected, and another resolution had been proposed and accepted. The President observed that it was impossible to discuss the matter that day, but some held that the relationship of the profession with the R.S.P.C.A. was such that this was not the time to get to cross purposes. It is eventually decided, on the proposition of Col. Simpson, seconded by Mr. G. P. Male, that the matter of free clinics be re-opened and further consideration be given to it.

Obituary.—Before the Secretary read the correspondence, the President made reference to the death of Col. P. W. Dayer-Smith who had for many years been a member of the Royal Counties V.M.A. The members stood for a moment in silence.

* Received for publication June 2nd, 1938: insertion unavoidably delayed.

Correspondence.—The Secretary read letters of apology from the following members for inability to attend: Mr. J. Bell, Major J. Bell, Capt. J. C. Coleman, Capt. J. A. Craft, Dr. T. Hare, Capt. J. R. Hewer, Major W. H. Kirk, Major-General Sir John Moore, Mr. E. S. Paterson, Mr. J. Willett and Mr. R. A. Willett.

Three letters were read by the Secretary—from Mr. P. Crosfield, Mr. H. Gooch, and Capt. W. Townson—tendering their resignations from membership. It was proposed that Mr. Gooch's and Capt. Townson's resignation be accepted with regret, but the Secretary was instructed to write to Mr. Crosfield and ask him to reconsider his decision.

A letter was read from Major Kirk in which he deplored the fact that there was so much clashing of dates in the arrangement of Divissional meetings, and suggesting that all Secretaries of Divisions should be asked to send a list annually to the Secretary of the N.V.M.A. intimating the dates on which they propose to hold their meetings. The Hon. Secretary pointed out that this was already being done in the case of the Royal Counties, and that the days of meetings of the Royal Counties had been unchanged for the last 25 years. After some discussion the Secretary was instructed to write to the Hon. Secretaries of some neighbouring Divisions informing them of the dates of meetings with a view to preventing future clashing, also to Major Kirk explaining the position.

A letter was read from the Secretary of the N.V.M.A. intimating that following the report of the Poultry Technical Committee there was a likelihood that in the near future panels of veterinary surgeons competent and willing to undertake work amongst poultry would be set up. The "National" was therefore urging its Divisions to organise courses of instruction in connection with poultry diseases for the assistance of those members who wished to participate. After some discussion the Secretary was instructed to send a circular letter to all members asking for their views on the desirability of organising such a course.

The Secretary read two letters from the British National Committee of the thirteenth International Veterinary Congress which is to be held in Zurich-Interlaken, August, 1938. In the first letter the Committee expressed the hope that the profession in this country would be well represented in the membership of this Congress, and therefore sought the help of the Division in persuading its members to apply for membership of the Congress. In the second letter the Committee intimated their intention of establishing a fund for the purpose of providing some financial assistance for members of the profession in this country who have been nominated and accepted as reporters, for on the occasion of this Congress it is required that reporters shall be present in person. The British National Committee therefore appealed to the Division to contribute to the fund.

After some discussion the meeting decided that the Division should guarantee the sum of £2 2s. 0d. to the fund, if it were found to be required.

The Secretary read a letter from the National Horse Association of Great Britain asking for a renewal of the Division's subscription of one guinea. The Council had recommended that the subscription be renewed, and it was therefore decided to do so.

Mr. McIntosh, at this stage, said that he wished to express a complaint in connection with the travel arrangements which had been made by the British National Committee to and from the thirteenth International Congress. These arrangements had been put into the hands of the American Express Company, despite the fact that there were several British companies competent and willing to undertake them.

Col. Simpson pointed out that the American Express Company was appointed by the Permanent Commission of the Congress and not by the British National Committee.

Mr. McIntosh: The British Committee, nevertheless, had their say and I still wish to voice my protest.

Nominations for Election to Membership.—The nominations were made of Mr. E. Brown, of the Ministry of Agriculture and Fisheries, proposed by Mr. G. P. Male, seconded by Mr. H. Bell, and of Mr. R. Machin, of Henley-on-Thames, proposed Lt.-Col. Greenfield, seconded Mr. H. Bell.

Elections to Membership.—Mr. J. F. D. Tutt, of Winchester, and Mr. W. F. Jarratt, of Fleet, were unanimously elected to membership.

Elections of Representatives on Council of N.V.M.A.—Lt.-Col. Greenfield and Major R. C. G. Hancock (with the Hon. Secretary *ex-officio*) were elected as the Division's representatives on the Council of the "National."

Place of Next Meeting.—It was decided that the Summer Meeting of the Division should be held at the Zoological Gardens, London, if arrangements could be made.

Any Other Business.—It was decided to defer discussion on Col. Simpson's resolution "That the Annual Dinner or Luncheon be held on a date other than that of the Annual General Meeting" to a future meeting.

President's Address

The President (Lt.-Colonel H. G. Greenfield) then delivered a lengthy, lively, and provocative presidential address, in the course of which he said that it was with deep gratitude and much pride that he thanked the members for his election to the Chair. Some of his predecessors

might, like himself, have been rank and file practitioners—many of them had attained a degree of eminence well known to them all—but what was more inspiring to him was the fact that many of these great men were with them still. None, however, had entered upon that task—which he had consented to undertake only after it had been represented to him that it was his duty to do so—with a higher resolve of endeavour.

His experience, embracing many years' work in Government service in various parts of the world, was, in conseq?uence, riper from an outside view than from the inner, with which so many of them were cognisant from their ceaseless work for the profession. He did not, therefore, think it of value for him to review the position of the profession, in the usual way—especially the various changes in England, of which his hearers all must know more than he did—but he proposed to attempt the "bird's eye view" and possibly the view of those outside the profession, for which his experience might have given him a qualification.

It was customary for addresses of this nature to discuss the outlook and future of the profession. Sometimes these discussions were full of foreboding, sometimes they were optimistic, at others a little of both. Although no one could foresee all the forces of the future, the work of their forefathers had raised the profession steadily and consistently, showing them the way—a possible way. Their science had improved by leaps and bounds in a manner that should facilitate their efforts to counteract depressions; but, as their history showed, and making reasonable allowance for changed conditions they could not foresee, the outlook, prestige and position of the profession would be precisely what they made it—no more and no less.

If they went on as they were, with a great body working honestly to give the State and its constituent parts the service of the science built up by the profession, working loyally with their neighbours and remembering the debt they owed to their predecessors, progress would be theirs. But if their hopes were chained to the waggons of tradition they would progress but slowly.

As a traveller and one within measurable distance of the allotted span, he had seen South Africa raised from the slough of repeated or constant disease scourges to a successful animal breeding centre, the Soudan converted from the unknown and despair from rinderpest, to a meat-exporting zone, and distant isolated colonial islands cleared of disease and given a promise unknown before. The first was the result of the labours of men like Hutcheon and Theiler; the second, the effect of the genius of Ulysses Carr, of his (the speaker's) Corps, and his devoted successors; the last the work of the rank and file, whose labours might never reach fruition under present conditions.

He had been in touch and co-operation with the work of the profession in the great dominions and new countries where its services not only controlled diseases but also great animal bureaux, dominating all animal health and welfare. From seeing with pride what untrammelled veterinary services could do there, and in many of the great advanced continental States, where professional work was organised effectively, one came to this country. Here, practically every veterinary institution or work was handicapped by laymen, muddle and overlapping, and the veterinarian's sphere invaded by the canker of encroachment, a canker that seemed as virulent as it was increasing.

Now with this contrast and with this situation, they were constantly being told that they were quite as good as another profession. Well, it took a great many sorts to make a world and there might be some dispirited souls to whom that assertion might give pleasure or hope. But to those who were little interested in exuberant oratory, it meant little—unless it was a smoke cloud to hide the profession's deficiencies. Their orators never told them whether this equality referred to science, remuneration, organisation, social position or prestige. A little research or investigation on these lines might do good. For instance: a great institution was recently dedicated to the service of the profession. The address on its growth and completion made no reference to the fact that it was built—and in the opinion of most of them could only have been built—by the inspiration, genius and work of one of their own men.

Turning to the Colonial Office, Mr. Amery, from that renowned home of Empire aspiration and ideal, after a tour of the Colonies, was convinced that the life and progress of our great colonial possessions were dependent upon the welfare and health of animals, animal transport and animal products. He obtained sanction for a combined untrammelled veterinary service, organised for research and post-graduate education, under a veterinary adviser at the Colonial Office, as the essential foundation. This placed in the hands of the profession a great responsibility, and probably the greatest direct measure of opportunity offered to science in the history of the world.

Since then the scheme had been dropped, ostensibly on the score of economy. Was there anyone so stupid in the profession or outside it as to think that this country, with its revenue of hundreds of millions, could not, if it *wanted* to do so, afford the few thousand pounds to help develop in this way those vast

areas, for some of which other European powers would be prepared to stake their whole existence and Empire?

If the veterinary adviser and a real scheme were not wanted, then why did we not seek the cause and face the facts; pandering to no more delusion? He had spoken guardedly but to some point on this matter a year ago: it was then voted one of national urgency—and well it might be.

Turning next to the Ministry of Agriculture, one should speak with care, perhaps, when now their prospects in the great measure proposed for animal health were apparently in the melting pot, when decisions to be made might spell ruin to large numbers of their colleagues, and possibly produce anarchy in their present system of service to the State. But it was a pertinent question. Why was there this chaos and would their sister profession be in this position? Although cognisant of progress and work done by the profession and its leaders past and present, one shuddered when one thought of all this in contrast to the rapid strides, the position and organisation seen elsewhere.

To investigate the position, which appeared an obvious duty, it was necessary at once to crystallise one's ideas on facts, examine the forces for and against the profession, confining oneself to those within its power to use or shape, and then estimate the weakness and act accordingly.

At the outset, let feeble excuses, such as insularity, be eliminated. This country might be conservative and hinder them by traditional systems and control, but radical reforms here—such as State health service, State pension services, etc.—were in advance of any country, throwing tradition to the winds. Many of the countries with a thoroughly organised development of their veterinary services were as old as, or older than, our own. The outstanding characteristics in the different and distant services quoted and admired, were *unity* and *purpose*, whether they were in our dominions, a great democratic State like the American, a small colonial island or a continental country or empire with a State veterinary service.

First to examine their forces: They saw their educational and professional attainment raised, in three or four decades, to a standard second to none and suitable for any profession—raised, almost entirely throughout, at their own expense and acumen, until the teaching of to-day was marvellous, when reviewed in the light of actual experience of an interval of but thirty years. In parenthesis, however, it should be said that it was essential that the practical study of large animals and their diseases should be re-organised and developed at once. This should be easy and rapid, by a nation that 20 years ago, in the Great War, extemporised, immediately, the transport and hospital accommodation of the greatest numbers of sick animals treated in the history of the world. Perhaps it might even now be in hand where most needed, if certain events had not happened.

Next they saw themselves possessing with pride a single qualification: their members from a few rival schools and therefore always close to friends known for a lifetime; all without over-crowding, confined in a small country, with all the obvious opportunities of co-operation and mutual support, yet so sadly lacking.

Against these advantages there must be recognised the high expense of their calling, the large area covered by each practice, the provision of drugs and equipment, the handling, transport, nursing and hospital accommodation of their patients, in addition to the provision of treatment or the giving of professional advice; also the great range of patients, their multiplicity of diseases and their hygienic and economic requirements; the catastrophic fall in horse transport with its consequent transfer of professional attendance to other spheres and, lastly, the similar depression of wealth among their greatest customers in agriculture.

To meet these situations, what was the organisation of their forces? There was the supreme body of the R.C.V.S., to fulfil the duties prescribed in their Charter: to make provision for the education and qualification of veterinary surgeons, their protection and the maintenance of law and order. Next there were some 30 Branches and Divisions such as that—some old, some young—quite recently welded together in the "National."

To anyone, a newcomer into the politics of the profession, the outstanding feature was the extraordinary paucity of workers. As a member of five or six societies and a visitor to some others, one saw a limited number of great-hearted members of their calling, working grandly for the cause, with little support—but perhaps not so little as they probably had when they gradually built up these branches, or the R.C.V.S. or the "National" to what they were: monuments to their work.

But had it occurred to their minds, as it surely should, the demand made on one of these, to be at one and the same time, a practitioner working for his living in a calling none too remunerative, a professional politician, the judge of his neighbour when on the Registration Committee, and occasionally a representative of the profession on a deputation?

It was understood that some objected to members of the Registration Committee joining in politics. One could wonder if there would ever have been any politics if they had not so

joined, or how poor their debates might be without their knowledge and ripe experience. But surely it was time that they were accorded greater and full support, and time for re-organisation.

Firstly, neither the appointments held by members of the profession, nor their practices, were lucrative. Few attained a state of financial independence. Fewer still utilised their power and experience to concentrate their efforts, or undertake consultant work, and perhaps as few supported them, or encouraged them so to do.

Secondly, though there existed laws of professional etiquette, there was no organisation whatever for their furtherance, and little if anything appeared to have been done even for their maintenance.

The President proceeded to express profound disapproval of the action of such practising members of the profession as did not scruple to describe themselves as "specialists," without possessing any of the requisite qualifications; also of those few, in other walks of veterinary life, who appeared to have overlooked the fact that, if the members of the profession were to acquire the prestige and recognition that would obtain for them appointments, remuneration, power of a professional body, and a return for their knowledge and science, then they must place professional bearing, ethics and rules first. There must be no wavering on account of other considerations, be they expediency, friendships, dignity, precedent or anything else. Their ethical rules and efforts must be directed to the upraising of the code and its supporters, and not confined to the escape or conviction of its delinquents: "Remember it is not just what we think or wish on these matters which wins for us our goal—it is the manner in which our actions draw the profession together for a great common purpose, and how we behave, each and every one of us, in the eyes of the nation. Although there are but 30 or 40 of us here, we are assembled for the good of our community. If we look backward, we may squabble, but if we look forward, and raise a banner with a proper appeal to our professional brethren, there is no reason why this gathering next year should not number a hundred, and why we should not advance our cause."

Proceeding, the President observed that in their election addresses, banquet oratory and deputation descriptions, they pictured every qualified veterinary surgeon as equal and capable of carrying out to the full, the duties of their calling. It was the basis of their claims, but was it the basis of their actions? If they permitted conditions under which their members might improperly be placed in financial difficulties, they not only failed in their moral duty to them and weakened the profession inherently, but they were guilty of hypocritical betrayal of the profession and the State.

Whatever all that might seem to them, veterans in age, experience and tolerance, let them think for a moment what effect these conditions would have on youth. The population of these islands, indeed perhaps of the whole civilised world, was divided into two very definite sections, the pre-war and the post-war. The older generation saw the Great War as the product of drift, accentuated by the other side—the subsequent peace, a muddle intangible and unavoidable. The post-War section had been taught that the Versailles Treaty was ridiculous and immoral, and believed the present immasse and expense to be the product of incompetence of their elders.

The great flood of veterinary students with these latter views would soon be launched in a spate on the country. What would they think and do under the circumstances that had been discussed that night, and would they, under those conditions, provide the right type of general practitioner with which it was their duty as a profession to furnish the State? If not, it was the business of the profession to legislate accordingly, and to do so with rapidity.

At the present moment, the profession had little or no common purpose—no standard, and without it they could have no unity. Their institutions and organisation had done good service, but they did not appear to possess the requisite impetus nor meet the situation described. The Divisions of the "National" were unable to compete with the necessity, as the "National" itself had not yet reached the maturity required to enable it to take over anything connected with ethics, while the R.C.V.S. functioned both as the seat of judgment and the fatherly director—an impossible simultaneous mixture, an indiscreet alternative one.

Concluding, the President said: "Our children of to-day will carry the flag in a few short years. We must build a system in which everyone has a fair chance. Those that struggle on the upward path must be supported. The weak must be protected from being driven the wrong way.

It is proposed:—

(1) That the basis of our ethics should be entirely local, the foundation being, that no officer be elected in our State, to the council of our bodies, unless his nomination be approved by the majority of twelve of his own immediate neighbours, our code being based on the true English foundations: Trial by Jury, and "Charity begins at Home." This will ensure that no man will attain power to talk on ethics

or politics or judge his fellow men, unless his conduct reaches a certain standard—the best standard of all: that approved by men of his own life and circumstances, who know him. In practice, it is believed, no man will thereafter ever be nominated or advance unless he does so conform. On the other hand, in every area of the country, every member would have power to support the just, combine for a standard and receive an incentive to aim higher and take an active part in the profession.

(2) That the "National" and each Branch, form an Ethical Committee, to work for the creation of a standard of ethics and its furtherance. It is not proposed that these bodies be granted penal powers: with all the power, wealth and organisation of the B.M.A., penal power has often ended in loss of funds and members.

(3) That our Divisions work actively to enlist their members in a system of true fellowship and co-operation, pledging themselves to submit all professional disagreements to the ruling of the Ethical Committee. Eventually this could be developed into a system under which neighbours' work, equipment and accommodation could be made mutually supporting, or practices could be pooled, combined or controlled as each group of members desired.

(4) That the R.C.V.S. aim at the objective that all ethical questions, not appertaining to the question of removal from the Register, be dealt with locally—the object of this being to hasten the day when the R.C.V.S. shall be aloof, the seat of judgment or Court of Appeal, and not the constant subject of criticism, and the day when squabbles shall be settled on the spot and not develop into feuds.

"There, gentlemen, have been placed before you, views of our professional position and future, together with an attempt to outline some measures for their advancement. It is hoped that these views, and possibly the measures in some degree, will receive your consideration, and that, from this, there may be some advancement in our cause."

Vote of Thanks.—Mr. McIntosh proposed a vote of thanks to the President for his very able address, and remarked that it was not open for discussion, otherwise there might have been considerable discussion on some of the points which were contained in it.

Paper.—Professor W. C. Miller now, on the call of the President, rose to present his paper entitled "Some Aspects of Feeding in Relation to Livestock Disease." Before commencing his paper, however, Professor Miller said that he thought he owed an apology to the members because by the same post as had come his invitation to speak to the Royal Counties Division he had received an invitation from the Midland Division to speak on practically the same subject. His colleague, Mr. Scorgie, had presented a paper to the Midland and had dealt at some length with the aspect of vitamins, which might readily have been dealt with in the paper which he was about to present. Professor Miller thanked the members for inviting him to speak to them and said that if he did not seem over-profuse, he thought as he knew a great many of them so well, that that part might be taken as read.

[Professor Miller's paper, together with the discussion upon it and his reply thereto, received publication in our issue of August 13th (*V.R.* **50**. 33. 1041-1050).—Editor.]

The meeting terminated with the passing of a hearty vote of thanks to the essayist, and the payment of a similar tribute to the President for his conduct of the proceedings.

H. Bell, *Hon. Secretary.*

* * * * *

North of Ireland V.M.A.*

JOINT MEETING WITH THE V.M.A. OF IRELAND AT BELFAST

A meeting of the above Association was held in the Agricultural Building, Queen's University, Belfast, on June 4th, 1938. Mr. Kelly, the President, occupied the Chair and the following members were present: Miss Twyman, Messrs. Barclay, Cassells, Clarke, Dunlop, Ferguson, Finch, Foggie, Gilmore, Henry, Jones, Kerr, H. G. Lamont, W. S. Lamont, E. Macnab, Magowan, Monro, Morrow, McConnell, Senr., McLean, T. McNabb, Shanks, Sim, Robinson and Russell.

In response to an invitation to the Veterinary Medical Association of Ireland, the following members from that Association attended: Professors Browne, Kearney, O'Connor, and O'Dea, and Messrs. Brophy, Byrne, Crowe, Daly, Donnelly, Harnett, Kenny, Langley, Magee, Morrin, Mullaney, Murphy, McCarthy, O'Donoghue, Rogan, Sleith, Timoney and Whitty.

In the afternoon prior to the meeting a demonstration was given at the Veterinary Research Laboratory, Stormont, at which Mr. Lamont acted as spokesman. He conducted the members through the laboratory and gave a short talk, demonstrated by specimens, on piglet influenza, Trichomonas infection in cattle, and so-called wool-ball of lambs. Mr. Shanks demonstrated the injection of nembutal into the ear vein of a twelve-weeks-old pig for the production of anaesthesia, and answered a

*Received for publication August 23rd, 1938.

North of Ireland V.M.A. and V.M.A. of Ireland: Joint Meeting at Belfast.

number of questions arising from the demonstration.

After being entertained to tea in the Imperial Hotel, Belfast, the members met in the Agricultural Building, Elmwood Avenue.

The President extended a cordial welcome to the members of the Veterinary Medical Association of Ireland who were present and said that now these joint meetings had been properly inaugurated he hoped they would continue.

The minutes of the previous meeting, having been published in the *Veterinary Record* were passed and signed.

Apologies for inability to attend were received from Messrs. Norris, Dolan, McAllan and Camac.

A letter received from the North of Ireland Medical Association in connection with Air Raid Precautions was left to be dealt with by the Council.

Paper.—The President then asked Mr. Kerr to give his paper entitled, "Observations on a Contagious Bovine Abortion Vaccine Experiment."† Mr. Kerr read his paper and followed it up by showing lantern slides of graphs made in connection with the experiment, quickly going over the salient features of each animal as represented by the graphs.

The discussion was opened by Mr. J. F. Timoney (Dublin). [A report of the discussion and of Mr. Kerr's reply is inserted earlier in this issue.—*Editor.*]

Professor O'Connor in moving a vote of thanks to Messrs. Kerr and Timoney for the general excellence of both paper and opening, said how pleased he was at being at the meeting and seeing so many old friends and pupils.

Mr. Gilmore seconded the vote of thanks and Mr. Magee, in supporting the motion, remarked that the essayist had done a disservice to the practitioner in that they would now have no confidence in using abortion vaccines! The meeting concluded with a vote of thanks to Queen's University authorities for being so kind in lending the Association the use of the lecture theatre for the meeting.

†This paper received publication in the *Veterinary Record* of June 11th (Vol. 50. No. 24. pp. 717-730).

ARMY VETERINARY SERVICE

London Gazette—War Office—Regular Army

September 10th.—The following Capts. to be Majs. (Sept. 15th): A. G. Heveningham, C. U. K. Porter, A. G. Ralston.

Commands and Staff (India)

The following officers have vacated appointments in India:—

D.A.D.V.S.—Maj. R. C. G. Thwaytes, R.A.V.C. (Aug. 10th); Maj. W. J. F. Macartney, R.A.V.C. (July 4th).

The following appointments have been made in India:—

D.A.D.V.S.—Capt. A. G. Ralston, R.A.V.C. (July 4th); Maj. R. C. G. Thwaytes, R.A.V.C. (Oct. 8th, 1937).

* * * * *

Erratum.—In connection with the paragraph recording an outbreak of anthrax in Northern Ireland, reproduced in our issue of September 10th (p. 1184, col. 2), it is pointed out from Stormont that the impression, of course erroneous, is thereby created that the Ministry in Northern Ireland deal with anthrax by slaughtering animals, while the unfortunate reproduction also was made of the phrase "no spread of the disease is expected." We much regret the extended currency thus given — attendance at Glasgow being responsible—to a complete misconception of the methods employed by the Ministry of Agriculture in Northern Ireland in dealing with this disease.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Sept. 30th.—Annual Dinner of R.A.V.C. Old Comrades' Association, at Anderton's Hotel, London, E.C.4, at 7.30 p.m.

Sept. 30th.—Meeting of the Midland Counties Division, N.V.M.A., at Stafford, 2.30 p.m.

Oct. 3rd.—N.V.M.A. Committee Meetings, 36, Gordon Square, W.C.1.

Oct. 4th.—N.V.M.A. Committee Meetings, 36, Gordon Square, W.C.1, and **Council** Meeting, N.V.M.A., Connaught Rooms, Great Queen Street, W.C.2.

Oct. 5th.—R.C.V.S. Committee Meetings.

Oct. 5th.—Annual General Meeting of the Society of Veterinary Practitioners,, at 36, Gordon Square, W.C.1, 2.30 p.m. (Meeting of Council, 11.15 a.m.).

Oct. 5th.—Meeting of the Association of Veterinary Inspectors (Ministry of Agriculture and Fisheries) at 36, Gordon Square, W.C.1, 5.15 p.m.

Oct. 6th.—Meeting of the Scottish Metropolitan Division, N.V.M.A., at Royal (Dick) Veterinary College, at 2.45 p.m.

Oct. 6th.—R.C.V.S. Committee Meetings.

Oct. 6th.—Annual General Meeting of the Central Veterinary Society, Conway Hall, W.C.1, 6.30 p.m.

Oct. 7th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4 p.m.

Oct. 7th.—R.C.V.S. Committee and **Council** Meetings.

Oct. 13th.—Meeting of the Derbyshire Division, N.V.M.A., as Sutton Bonington, 2.30 p.m.

* * * * *

Report of Committee on Veterinary Education

We understand that the report of the Interdepartmental Committee on Veterinary Education will be published during the course of the coming week.

* * * * *

PERSONAL

Capt. Villar's Bequest to Benevolent Fund

Captain Sidney Villar, of Little Chalfont, Bucks, who died on July 28th, aged 79, left £40,302, with net personalty £28,252. He left, subject to his wife's life interest, £200 to the Victoria Veterinary Benevolent Fund.

. . . . .

Marriage.—Addison—Moore. On Wednesday, September 14th, 1938, at St. George's Church, Doncaster, Frederick Herbert Addison, B.V.Sc., M.R.C.V.S., D.V.S.M., to Harriett, daughter of Mr. and Mrs. C. Moore of Hyde Park, Doncaster. A reception was held at the Danum Hotel, Doncaster, a large number of guests attending.

. . . . .

Forthcoming Marriage.—The engagement is announced between Gordon S. Allen, M.R.C.V.S., "Sunnymead," River, near Dover, and Miss Freda O. Spence, Regent Street, Lancaster.

. . . . .

Appointment.—Mr. H. E. Hornby, Director of Veterinary Services in Tanganyika, has been appointed Director of tsetse research in succession to the late Mr. C. F. M. Swynnerton.

* * * * *

VICTORIA VETERINARY BENEVOLENT FUND

The Secretary of the Victoria Veterinary Benevolent Fund has pleasure in reporting that he has received the following special donations in aid of the Fund.

From Mr. R. Selcraig Murray of the Royal (Dick) Veterinary College, Edinburgh, a cheque for £7 7s., being proceeds of the sales of a photograph of the late Dr. Bradley taken in his garden at Gifford.

Also a cheque from Professor W. M. Mitchell of the Royal (Dick) Veterinary College for £4 16s. 6d., being the amount collected for the Fund at the Annual Dinner of the Alumnus Society held recently in Glasgow.

* * * * *

MEMBERS R.C.V.S.: ADDRESSES REQUIRED

The Registrar of the R.C.V.S. announces that the addresses of the following members are unknown to him. Information as to the whereabouts of these members is required in order that the Register for 1939 may be completed.

Branch, A. E.	Cairo, Egypt.
Findlay, J. H.	Trentham, Stoke-on-Trent.
Graham, J.	Ministry of Agriculture, S.W.1.
Hart, A. K.	Upton-on-Severn, Worcs.
Hind, J. H.	Skegness, Lincs.
Kennedy, W. R.	East Molesey, Surrey.
Lightfoot, H. P.	Bishop Auckland.
Little, S.	Cockermouth, Cumberland.
O'Donoghue, W. J.	Carrick-on-Suir, Co. Tipperary.
Purcell, P.	Dublin.
Walker, J. P.	Pencaitland, East Lothian.
Walshe, S. L. H.	London, N.W.1.
Whitemore, H. E.	Langport, Somerset.

* * * * *

MILK AND NUTRITION

"An interim report to the Milk Nutrition Committee on 'The Effects of Dietary Supplements of Pasteurised and Raw Milk on the Growth and Health of School Children' has been published by the National Institute for Research in Dairying. The report deals with the data obtained of height and weight at the first and last examinations of a series extending over a year, made on 6,099 school children in Luton, Wolverhampton, Burton-on-Trent, Renfrewshire and Huddersfield. The children were divided into four groups, the first (control) group rceeived biscuits, the second one-third of a pint of pasteurized milk, the third two-thirds of a pint of pasteurized milk and the fourth two-thirds of a pint of raw milk, as daily supplements to their home diets. The groups receiving milk showed greater increments in height and weight than those receiving biscuits, and, in the case of the children receiving two-thirds of a pint of milk, increases of 4 to 6 per cent. in height and 9 to 10 per cent. in weight over the control groups were found. The response to milk supplements of children, initially classed as 'well nourished,' appeared to be better than in children of a lower standard of nutrition. This

may be due to the utilisation of the milk in making good 'structural' deficiences before it begins to affect growth. No significant differences could be detected between the effects of raw and of pasteurized milk."—*Nature*, July 23rd, 1938.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

* * * * *

METHODS OF TUBERCULIN TESTING

To the Editor of the Veterinary Record

Sir,—Several interesting matters have come to light as a result of the correspondence relating to methods of tuberculin testing, and not the least important is the observation that, so far as I am aware, no one in an official capacity has taken this matter up in your columns. Surely officials are the people who should be most conversant with the tests and most interested in them? I would ask the Editorial Committee to review their decision not to publish anonymous letters and to be willing to publish such letters provided they are not libellous and that the writer sends his card. Many serving officers who are really interested in our work and policy are muzzled by this Editorial ruling.*

Turning to the matter of the tuberculin test, the following points arise from the correspondence:—

No statistical evidence as to the reliability of the double test has been offered or indicated.

No real comparative statistical evidence between the two tests under discussion seems to be available.

There has been no reply from any member of the teaching fraternity, Government staff, nor from the Chairman of the N.V.M.A. Committee who reported that "nothing could be done in the matter." It is from these sources that a helpful reply could reasonably be expected.

It seems to be agreed that measurements are unnecessary, and that a reading is better taken at the 72nd or 96th hour than earlier; further, there appears to be some agreement as to the difficulty of interpreting the double test.

A good deal of objection is taken to the single test on the grounds of its being "a filthy mess and not at all practicable with animals which spend most of their lives out of doors." I myself have tested many thousands of head of cattle in Canada and can state that in my experience, if properly performed, the single test need not be a "filthy mess," and using the word "hygiene" as "the study of the various methods that should be taken to conserve health, and to prevent diseases" it is not unhygienic.

May I suggest that the Chairman of the N.V.M.A. Committee which dealt with the matter be invited to clarify this discussion?

To overcome the matter of the "dirty" caudal fold site I would ask whether or not the authorities would have any objection to a single injection test in the neck site to be read at the 72nd or 96th hour, with an interpretation based on the character of the swelling?

It seems, Sir, that an N.V.M.A. enquiry into these matters *is* urgently required, for in the matter of tuberculosis eradication in cattle we lag far behind the United States and Canada, and in both of these vastly populated countries the single test is used.

I regret having taken so much of your space but my excuse is that the matter is important.

I am, Sir,
Yours faithfully,
Edward F. Peck.

Burao.
August 10th, 1938.

* The Editorial Committee are considering the suggestions put forward by Mr. Peck.—*Editor.*

* * * * *

THE PROBLEM OF CRUELTY TO ANIMALS

To the Editor of the Veterinary Record

Sir,—The paper on the Problem of Cruelty to Animals and the discussion thereon was to me quite interesting, and how many of us must agree with Mr. Glave Saunders when he states that "we have too many animal protection societies." If the funds of these societies were used for protection, and they were debarred from treating animals, it would, I think, be better on the whole for animals.

It would be interesting to hear from Major Ascott, what he considers "tail hair" was given to horses for.

Mr. Gibbings is reported as having said that he "doubted very much if there was any pain in an overstocked udder." Has he by any chance seen a female of the human species in a like condition? Even accepting as a fact the assumption that animals are not so sensitive to pain as human beings, and that assessing "the degree of pain by human standards might be a dangerous line," I cannot suppose that a cow is quite insensitive to an udder overstretched by forcibly retained milk.

Yours faithfully,
R. T. Davis.

4, Market Buildings,
Swathling, Southampton.
September 17th, 1938.

* * * * *

SUMMER MASTITIS

To the Editor of the Veterinary Record

Sir,—On reading the address of Dr. Stableforth to the Central Veterinary Society and the reference by two speakers to BIPP as a preventive of summer mastitis, I thought I would give my experience of a modified treatment I have used during the last few years. At one time I used bismuth sub-nit. and iodoform—one of each to four of liquid paraffin—and injected two ounces into each quarter. I admit this was somewhat irritating, especially for heifers. I am now using bismuth sub-nit., one part to eight liquid paraffin, with most satisfactory results. Iodoform is not actually necessary but I usually add two drams to the pint. Of this mixture I inject into each quarter one to one-and-a-half ounces. Early in the season I use the larger quantity and as the summer passes one ounce is sufficient. I have never had a bad result. One recommendation for this treatment is that one application suffices. It is absolutely necessary that the injection be made immediately the cow has gone "dry" and not weeks after the cow has been turned out and infection has already taken place.

John Brown, F.R.C.V.S., Invergordon.
September 19th, 1938.